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Farmers' decision-making on adjustment into the EU

Selostus: Maatilayrittäjien EU-sopeutumiseen liittyvä päätöksenteko

Academic dissertation

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To Sampsa and Loviisa

Preface

This study is the outcome of long labour. It is based on my licentiate dissertation on the same subject. I express my thanks to all the people who helped me complete that work, and especially Professor Karl Johan Weckman, who helped me get started as a researcher.

I extend my warmest thanks to Professor Matti Ylätalo for the guidance, support and encouragement he has given me during my four-year task. The support I have received from Dr Mikko Siitonen at different stages of my work deserves special mention. His encouragement and assistance greatly helped me finish my work.

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Moving back to my native Laitila to become a farmer at the beginning of 1999 brought a new depth to my views and motivated me to take the study forward. On the other hand, it has forced me to reprioritise my work.

My children, Sampsa and Loviisa, have over the years grown accustomed to Daddy spending his time in the study when home. I thank them for putting up with me and for the encouragement they have given me.

Last but not least, my wife Elina deserves my special thanks for all her support and understanding, which has helped me a great deal in my work.

Salo, Laitila
December 2001
Sauli Sonkkila

Esipuhe

Tämä tutkimus on pitkän työrupeaman tulos. Työ pohjautuu lisensiaattityöhöni, joka käsitteli samaa aihealuetta kuin käsillä oleva työ. Kiitän kaikkia niitä, jotka tuolloin olivat edesauttamassa työni valmistumista. Erityisesti haluan mainita professori Karl Johan Weckmanin, joka auttoi minua tutkijaurani alkumetreillä.

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Muuttaminen takaisin synnyinseudulleni Laitilaan ja ryhtyminen maatilayrittäjäksi vuoden 1999 alussa on omalta osaltaan syventänyt näkemyksiäni ja motivoinut tutkimuksen eteenpäinviemisessä, vaikka toisaalta onkin pakottanut asettamaan työt tärkeysjärjestykseen.

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Laitilan Salon kylässä
joulukuussa 2001
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Farmers' decision-making on adjustment into the EU

Sauli Sonkkila

Abstract: This study aims at explaining farmers' decision-making on adjustment into the EU, and examining changes in their objectives, values, attitudes toward risk, managerial issues, and the significance of risk factors in the changing operational environment.

The empirical data for the study consisted of three sets of data. A postal survey in 1993 was conducted for active Finnish farmers with at least 10 hectares of arable land. In 1998, a follow-up survey was carried out for the same set of farmers who responded to the 1993 survey. These two data sets were complemented and validated by the data received from the rural business register.

Almost half of the farmers had maintained current production, one fifth had expanded production and 15% had quit production. The tests indicated that the production and economic factors of the farm, characteristics of the farmer and the operational environment affected decision-making on adjustment into the EU. The magnitude and interaction of these factors seemed to vary from one farm and farmer to another.

The most important objectives and values had remained same during the five-year period. The most important objectives were those associated with risk management and the most important values were intrinsic values. However, farmers' objectives and values had altered somewhat upon joining the EU compared with the time before membership. Values associated with entrepreneurship and the objective of improving the quality of products had been less prioritised, while objectives related to the quality of life and leisure as well as environmental issues had been prioritised higher in the operational environment of the EU. The major reason behind these changes was the introduction of the EU common agricultural policy (CAP), which greatly altered the farmers' operational environment between 1993 and 1998.

Keywords: Risk, uncertainty, decision-making, objectives, values, farms, farmers, Finland, European Union

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1. Introduction

1.1 Background of the study

Risk and uncertainty increased considerably in Finnish agriculture during the 1990s. Uncertainty was probably greatest before Finnish accession to the European Union (EU) because it was known in advance that joining the EU would have a very strong influence on Finnish agriculture as well as Finnish farmers, although the impact of membership at farm level was particularly unknown. Finland joining the EU at the beginning of 1995 without a transitional period represents one of the biggest changes for the Finnish agricultural sector, and thus for the farmers (Kettunen 1996, 8).

The introduction of the EU's Common Agricultural Policy (CAP)[1] significantly reduced producer prices and added price variation of the main agricultural products in Finland. Income losses of farmers were compensated by different adjustment measures, which consisted mainly of various types of national and EU direct income supports. These supports were mainly determined by the number of hectares, type of crops, type and number of animals, as well as the location of farm and farm land. A part of the supports required farmers to commit themselves to certain environmental measures. According to Sipiläinen et.al. (1998, 165) direct support compensated only partly economic losses due to decreasing output prices. Agricultural entrepreneur and income statistics (Maatilatalouden yritys- ja tulotilasto 1998), the total calculation of agricultural income (Hirvonen 2000) and results from the Farm Accountancy Data Network (FADN) in Finland (Finnish Agriculture and Rural Industries 1998) also confirm the decreasing direction of the farmers' economic results in the EU.

The major target for structural policy and consequently structural support was to increase sizes of farms. Rules and conditions of structural support altered in the EU as well: for instance farmers were to commit themselves to being a full-time farmers; in other words, they were to receive the majority of their income from

[1] Article 39 of the Treaty of Rome specifies objectives for the CAP:
a) to increase agricultural productivity by promoting technical progress and by ensuring the rational development of agricultural production and the optimum utilisation of the factors of production in particular labour;
b) to ensure a fair standard of living for agricultural community, in particular by increasing the individual earnings of persons engaged in agriculture;
c) to stabilise markets;
d) to assure availability of supplies;
e) to ensure that supplies reach consumer at reasonable prices
(Ritson 1997, 1-2).

agriculture and forestry. In an uncertain operational environment to apply for structural support is a risky decision, because declining on-farm incomes require farmers to likewise lower off-farm incomes to meet the conditions of structural support. A low degree of applicants for retirement support during 1995-1999 (Maatilatilastollinen vuosikirja 1999, 102) can be considered to be one indication verifying this.

The European Commission's Agenda 2000 further lowered producer prices and compensated for this in part by an increase in direct support payments from the year 2000 onwards[2] (Agenda 2000 - Agriculture). Agri-environmental and less-favoured area support as a programme-based support had to be renewed and re-negotiated after 1999 as well. Furthermore, the level and form of national support had to be agreed from 2000 onwards. The total level of national support is declining, and the actual level of national support for each product is confirmed annually through political decisions. Moreover, animal-based supports in the southern part of Finland (A and B areas) are agreed only until the year 2002.

Although many of the uncertainties concerning adjustment measures of Finnish agriculture have been clarified, a number of uncertainties still exist concerning scope, timetable, permanence and possible modification of these measures. In the future new uncertainty factors will arise because of the planned expansion of the EU, WTO negotiations, and the pressure to further lower the intervention price of grain and to alter the current milk quota system. The new, unknown operational environment of the EU greatly complicates farmers' expectations about future change even in a single variable assessment, which has been verified, for instance, by Siitonen (1999, 83). Thus, farmers and their decision-making are more dependent on institutional decision-making, because supports play an essential role in farmers' income. In other words, the operational environment of the EU has greatly increased institutional risk in agriculture.

For the dramatically altered operational environment at the beginning of 1995, every single farmer had to make a decision concerning adjustment into the EU. This decision may have been conscious or unconscious. Alternative directions consisted of maintaining current production, expanding current production, reducing current production, changing current production lines, introducing additional processing for the agricultural products, increasing off-farm incomes, or quitting farming. According to Keane and Lucey (1997, 238) the policy change of the CAP may have forced many farmers to alter their strategic approach to their farm businesses. Farmers may have considered the creation of competitive

[2] The purpose for Agenda 2000 was to continue and complete the reform of the CAP in 1992.The basic political line was to increase direct payments while cutting producer prices, and to develop a coherent policy for rural development. Financial aid for environmental measures was increased and environmental obligations were introduced to the CAP.

advantage, for instance, by specialising production or integrating production vertically as suggested by Porter (1998b). One of the key issues farmers had to take into consideration while making their decision was the existing and forthcoming support level (Kettunen 1996, 8).

Adjustment was strategic and very critical for the farm and farm family; it involved multiple objectives and risk assessment associated with various types of uncertainties. The effects of long-term, strategic decisions extend over two or three generations (Ryynänen 1989, 506). The decision varied according to the type of farm as well as the character of the farmer. Therefore, it is difficult to estimate how Finnish agriculture adjusted to the EU without examining farm-level decision-making in this context.

Profit maximisation has been used as the basic assumption in most economic analyses of firm behaviour (Sloman 1991, 139; Varian 1992, 23), and this has also been applied in the farm business. However, many studies have indicated that in real life farmers employ several, possibly conflicting, objectives (e.g. Gasson 1973, 522; Smith and Capstick 1976, 13; Jolly 1983, 1109; Castle et. al. 1987, 4; Romero and Rehman 1989, 5; Giles and Renborg 1990, 401). Neither are the objectives of farmers static in nature, as the relative importance of various objectives is influenced by the family-farm life cycle (Boehlje and Eidman 1984, 9). The juridical form of a farm may influence behaviour as well. Finnish agriculture is based on family-farms; almost 90% of the active farms are family-run. Gasson and Errington (1993, 112) argue that the logic of family-farm behaviour is complex; rational decisions are made within a framework comprising intrinsic values in farm work, the values of autonomy and family continuity as well as maximising profitability. Giles and Stansfield (1990, 19) state that due to the complexity of farm business management, profit has to be balanced within other requirements. Willock et. al. (1999) emphasise the importance of psychological factors in the decision-making of farmers.

Gillmor (1986, 31-32) argues that the understanding of farmers' decision-making processes would enable more realistic and accurate prediction of behaviour. He continues that, especially regard to the CAP, farmers may give more attention to factors other than that of maximising agricultural profitability. Leibenstein (1979) argues that the theory and studies of intra-firm behaviour are not well established and sufficiently emphasised, although it is an essential part of the economy. According to Ryhänen (1994, 526), one of the reasons why economic studies have ignored other objectives than profit has been that other factors are difficult or even impossible to measure in an exact way. Sonkkila (1996, 127) concluded that the factors associated with a farm and farmer affect farmers' decision-making and are related in a complex fashion. In particular full-time/part-time farming, debts,

incomes, size of farm, production line as well as education, age, and the life cycle of farmers were involved in the decision-making.

1.2 Objective of the study

Most of the previous studies and data cannot be utilised to assess the adjustment process of Finnish farms in the EU to the enormous change in their operational environment. Consequently, new studies with recent data are needed. Therefore, quite a few micro and macro level studies have been conducted to describe farmers' production intentions and decisions for the future, and to predict how the structure of Finnish agriculture will evolve (Puurunen 1998). However, some of them are not intra-farm studies (i.e. Niemi et. al. 1995), and few of these have tried to explain the reasons and motives behind the intentions and decisions of farmers' because of the descriptive approach and an insufficient theoretical framework (see, for instance, Kuhmonen 1996; Ala-Orvola 1997), or then the theoretical framework has been primarily based on neoclassical production theory, which presupposes a rational, profit maximising decision-maker (e.g. Ryhänen and Sipiläinen 1996). However, Ylätalo et. al. (1998a, 170-171) have shown in a farm-level study that membership of the EU has changed farmers' production and investment behaviour. The studies have usually covered only a part of the adjustment process, and are based more on farmers' intentions than on real behaviour, or are based on data applicable to only some part of Finland or a certain production line.

Results of studies of farmers' objectives and values in other countries cannot be applied to Finnish farmers, as the operational environment, farm structure, values and culture vary considerably from one country to another. Sonkkila (1996) applied a multiple-criteria decision making framework to study factors affecting the decision-making of farmers. Because the study was mainly descriptive and involved exploratory cross-section research, the results cannot be sufficiently generalised, and the relationship of the factors affecting decision-making cannot not be distinctly explained. However, the findings of the study do provide give a decent basis for further explanatory research.

The main objective of this study is to explain farmers' decision-making on adjustment into the EU. The second objective is to examine possible changes of farmers' objectives, values, attitudes toward risk, managerial issues, and the significance of risk factors in the operational environment of the EU in comparison with that prior to accession.

The study aims at providing new information and gaining better understanding about farmers' decision-making in the operational environment of the EU; which farm and farmer-related factors explain decision-making on adjustment into the

EU. The results of the study can be generalised to the farmers' strategic decision-making. In addition, the study seeks to explore how the enormous change in their operational environment influenced farmers' objectives, values, attitudes toward risk, managerial issues, and the significance of risk factors.

The results of this study can be utilised to support the allocation of institutional measures to agriculture, to predict structural changes in agriculture and in the countryside, and to understand the reasons behind the choices of farmers. Political decision-makers should recognise factors affecting the decision-making of individual farmers while evaluating the impact of alternative measures, uncertainty factors, and marketing elements in agriculture, since farm-level decisions are the most essential elements that alter the structure of agriculture.

The results of this study also reveal what the most important criteria used by farmers in decision-making are, and how these could be better supported in the future. Thus, this study may be of use for educational purposes, advice, giving farmers information, and for developing decision support systems for them.

1.3 Methodological approach and research process

This study can be regarded primarily as a study in the field of business economy. The major distinction between business economics and micro economics is that business economics aims at investigating intra-firm behaviour, while micro economics is more focused on examining individual firms acting in the market (Honko 1985, 24). According to Neilimo and Näsi (1980), the methodological directions of business economics may be divided into nomothetic, decision-making methodological, operation-analytical, and concept-analytical classes. Accordingly, this study can be considered to be predominantly nomothetic. Lukka (1986, 137) states that a nomothetic study is empirical and descriptive (non-normative). The research process is presented in Figure 1.1.

The research problem of the study is deducted from current theory, results of previous studies, and gaps in the current knowledge[3]. The theory is presented in Chapters 2 and 3. Chapter 2 deals with risk and uncertainty in the farm business, and Chapter 3 deals with decision-making from several points of views that examine decision-making and theoretical approaches to this process. The selection and direction of the research problem itself has also been influenced by other factors like the researcher's own interest and knowledge of the problems. In Chapter 4, the initial hypotheses are stated, a theoretical model of the study is

[3] The method of study can be regarded as deductive rather than inductive.

formulated and this is then operationalised. Finally, the statistical hypotheses are formulated and stated.

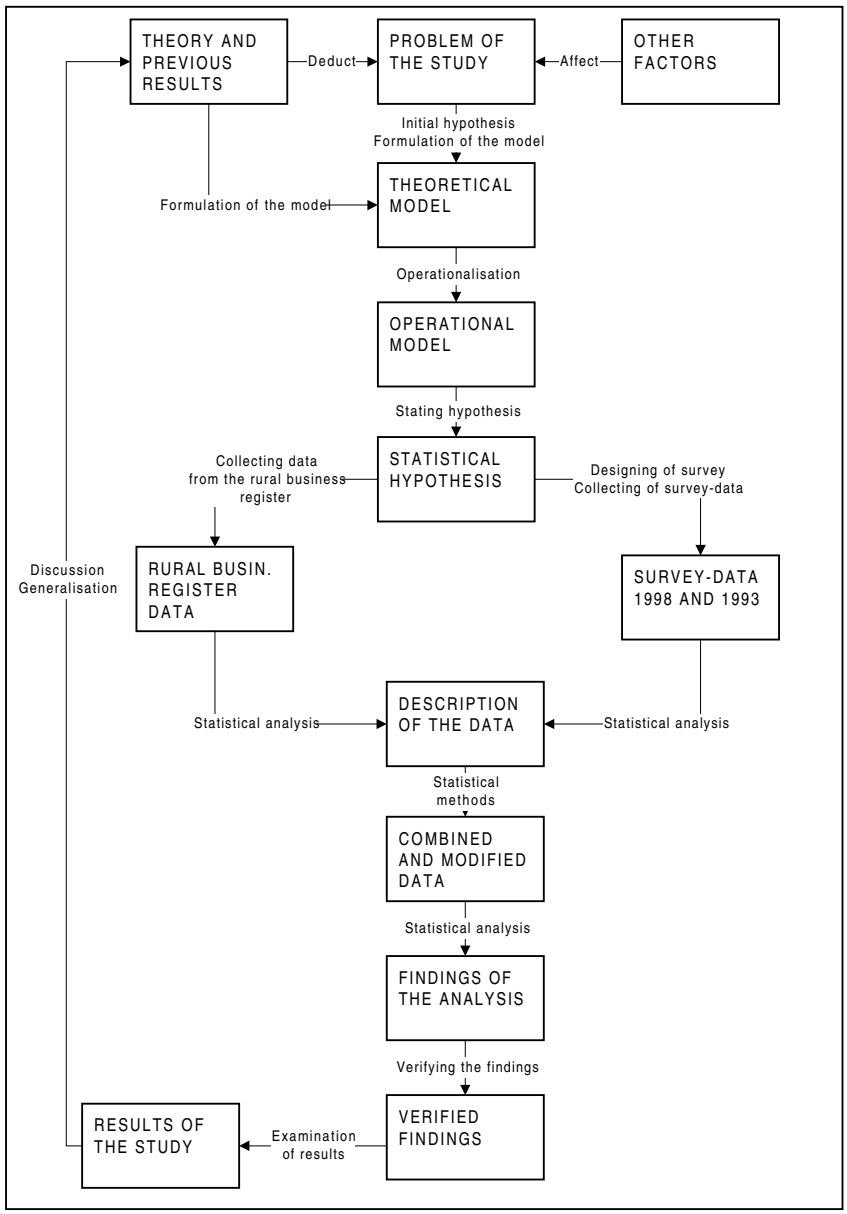

Figure 1.1 Research process

Chapter 5 provides the empirical part of the study. This is based on three sets of data: survey data of 1993, rural business register data from 1995-1998, and survey data of 1998. All of these deal with the same set of farmers. Therefore, the data can be regarded as panel data. The data set is based on the systematic random sampling

method. The empirical data is mainly quantitative[4]. The utilised survey data and the usage of applicable research methods do not enable the deep understanding of the phenomenon but do explain it (see Hirsjärvi and Hurme 1979, 16).

The data are then transformed, combined, explored, and described by employing statistical methods, and the indicator of the adjustment into the EU is derived from the data. Statistical tests are performed to test the hypothesis. Finally, the factors affecting adjustment are examined and explained, and the changes of farmers' objectives, values, attitudes toward risk, managerial issues, and the significance of uncertainty factors are assessed. The findings are verified, the conclusions are drawn from the findings and the results of the study are discussed and generalised in Chapter 6. Chapter 7 provides a summary of the study.

[4] The comparison between quantitative and qualitative data has been discussed for instance Uusitalo (1991, 79-82).

2. Risk and uncertainty in the farm business

2.1 Concepts of risk and uncertainty

Risk and uncertainty refer to the degree of knowledge in decision-making. The concepts of risk and uncertainty are defined in various ways in literature. The decision theory classifies decision problems into decisions under certainty, decisions under risk, and decisions under uncertainty (Eppen et. al. 1988, 504). Decisions under certainty occur when decision outcomes are known with certainty. The decision-maker is supposed to know the probabilities of each state of nature in a risk situation compared to being unable to specify the probabilities of each state of nature in a uncertainty situation. Correspondingly, Knight (1921, 19-20) defines risk to be a susceptible of empirical measurement, while uncertainty is non-quantitative. Thus, the distinction between risk and uncertainty in the decision theory is focused primarily on objective versus subjective probabilities[1] (Sonka and Patrick 1984, 96).

In contrast to the quite sharp distinction between risk and uncertainty in the decision theory, some authors do not distinguish between them. Sonka and Patrick (1984, 96) argue that all probabilities in decision-making are to some extent subjective; thus the distinction between risk and uncertainty is unimportant. Colson (1985, 171) argues that existing theories of risk are limited because uncertainty and risk are too narrowly conceived. Colson's definition is that uncertainty is produced by everything which is a cause of unknowness on the part of the decision-maker as far as it is related the his decision-problem, while risk is a combination of uncertainty and value. The amount of risk increases if either uncertainty or value increases and becomes null with one of them.

Hertz and Thomas (1983, 3) emphasise that many decision situations are unique and non-repeatable; thus even though distinction between risk and uncertainty may be useful in conceptual terms, they have limited value in the practical process of risk assessment and analysis. They define risk as both uncertainty and the result of uncertainty. According to Fleisher (1990, 16) uncertainty means a situation in which the decision-maker does not know the outcome of every action and risk means a situation in which the resolution of uncertainty will affect the well-being of the firm or decision-maker and which involves the chance of gain or loss. Fleisher (1990, 22-24) also states that the existence of variability does not necessarily create

[1] Objective probability refers to the probability, which is based on deduction from a set of assumptions or determined by repeated empirical observations (Chou 1989, 185). Subjective probability instead means probability, which is based on decision-makers' beliefs in the occurrence of particular event (Castle et. al. 1987, 164).

risk, but unexpected variation. Therefore, the risk is also affected by the expectations of the decision-maker. Similarly, Hardaker et. al. (1997, 5) define uncertainty as imperfect knowledge and risk as uncertain consequences.

Risk and uncertainty are defined broadly in this study. Uncertainty refers to circumstances in which the consequences of decisions are not known by the decision-maker precisely. Risk refers to the factors leading to the possible harmful consequence of decisions made under uncertainty.

2.2 Sources of risk in the farm business

Most of the decisions in the farm businesses are made under uncertainty. Farming has always been considered a high risk business subject to a large number of uncertainties, but during the 1990s the amount of risk increased greatly in Finnish agriculture. Moreover, the relative significance of separate sources of risk also altered. Sources of risk in the farm business can be classified in many ways; in this work the classification follows the common practice of classifying risks according to the type and characteristic of the risk into production risk, market risk, financial risk, technological risk, accident risk, institutional risk, and human risk (see for instance Boehlje and Trede 1977; Sonka and Patrick 1984; Castle et. al. 1987; Nelson 1990; Hardaker et. al. 1997).

Production risk is due to the biological production process of agricultural products. Factors causing production risk are, for example, weather, diseases of animals and crops, and pests. The relative significance of production risk declined in the 1990s as the significance of other sources of risk increased. The absolute amount of production risk has also slightly decreased with the improved accuracy of weather forecasts, the availability of better varieties and the invention of new pesticides and fungicides as well as the introduction of area- and animal-based supports, which are not tied to the amount produced. However, the risk of a serious outbreak of animal disease of epidemic proportion has been increasing since 1995, because the health of animals in most of the other EU member states is worse than in Finland. This is due to the fact that live animals can easily be imported from one member state to another, and because people nowadays visit foreign countries more often than in previous decades.

Market risk results from unpredictability and variability of production prices and input prices, and uncertainty of markets. The relatively long production period of agricultural products leads to a time lag between production decisions and products coming on the market. Therefore, the supply of agricultural products is fixed in the short run (Fleisher 1990, 30). Production decisions are made on the basis of known or expected price and profit, as well as other factors related to the objectives. Thus,

market risk together with the variability due to production risk causes variation in supply, which may lead to high price fluctuations for the low price elasticity of demand for agricultural products (Sloman 1991, 418). This is described as the cobweb model where the divergent cobweb is accomplished if the demand curve is steeper than the supply curve (Chiang 1984, 561-565).

With regard to the specific importance of agricultural commodities, most countries have taken various measures to reduce market risk. In Finland, a target price system guaranteed certain producer prices and markets for the most significant products before accession to the EU, while the price level of other products was determined mainly by supply and timing of sales. Thus, the importance of market risk was relatively small before 1995.

The variability of producer prices has increased in the EU because the target price system has been replaced by the intervention mechanism, which covers only part of the major agricultural products. In addition, the predictability of the price level for non-intervention products in the EU is more complicated than that of products which were not target price products before Finland joined the EU, because supply, demand, price level and incidents in other member states affect the producer price in Finland. On the other hand, the relative share of producer prices of farmers' incomes is much lower in the EU due to the various supports which partly compensate lowered producer prices. Therefore, the absolute and relative importance of market risk varies from one farm to another.

Financial risk is influenced by the amount and structure of debt, the availability of financing and the timing of incomes and expenditures. Financial risk increased in Finnish agriculture in the 1980s as a result of increasing liabilities, variability of interest levels, and lowered security values of agricultural assets (Ylätalo and Pyykkönen 1991, 26). In addition, debt is distributed unequally in farm businesses; in principle the younger the farmer, the more indebted the farm. The increased dependence on supports, which are mostly paid at the end of the year, has increased the importance of liquidity planning, and therefore increased financial risk. The lowered profitability of farm businesses (see Finnish Agriculture and Rural Industries 1998, 75) in the EU has added financial risk as well.

Financial risk can be measured by means of financial ratios reflecting liquidity, solvency and profitability. Liquidity refers to the ability to meet continuous financial obligations. Solvency indicates sufficiency of capital in the long run. Profitability means that usage of capital pays back the amount used as well as the required profit (Artto et. al. 1989, 78). Solvency can be measured by the debt/asset ratio. The debt/total returns ratio measures turnover of foreign capital.

Technological risk is due to the development of new technology and methods as well as the reliability and productivity of current technology compared with new technology. Adopting new technology early causes risk, but holding on too long to old technology means ineffective production. For instance, Ryhänen (1994, 590) concluded in his study that technological development had been advantageous to dairy farms. One of the future issues raising technological risk is the development and introduction of biotechnology.

Accident risk concerns both means of production and members of the farm business. Means of production may be affected by fire, wind, hail, flood, and theft. Injury to a farmer or other family members may halt or cut down production. Accident risk for members of a farm business may increase in the future if the share of old farmers becomes larger with a low degree of transfer of farms to future generations.

Institutional risk results from the interest of government and other institutions influencing agriculture through various laws, regulations and rules. Institutional risk has been increasing in the last decades, especially in the 1990s. Joining the EU altered laws and regulations on agriculture in Finland greatly, and at the same time dependency on supports, determined by political decision-making, increased considerably. Institutional risk takes effect, for example, through changes in support and control regulations, alternation of the quota-system, changes in taxation rules, changes in the commitment to environmental measures, or the introduction of different quality requirements by various institutions and industries. Although institutional measures lead to institutional risk, they may decrease market risk in particular by setting up mechanisms to guarantee the market and a certain level of price. According to Siitonen (1999, 90) institutional risk is more difficult to predict and thus manage than other risks.

Human risk is due to the unpredictability of individuals in production. Individuals have diverse skills, experience, education, attitudes toward risk, needs, values, objectives, cognitive styles, and states of health. This may lead to conflicts and unsolved conflicts may in turn halt or cut down production, or even break up the farm. Human risk can be considered to have increased in the 1990s because the demand for management and various skills of farmers rose as did pressures from other groups for farming.

Production, technological, accident and partly market risk affect the production process mostly; financial and market risk mainly affect the economic process of the farm, whereas institutional, human and to some extent accident risk influence the farmer directly. Therefore, the increase of risks in the farm business has had an immediate bearing on farmers, and thus raised the pressure.

Patrick et. al. (1985) studied risk perception of crop and livestock farmers in the United States. Crop farmers assessed weather, output prices, inflation, input costs, diseases and pests, as well as world events as the most significant risk factors, while livestock farmers assessed output prices, input costs, weather, inflation, diseases and pests, as well as inflation as the most significant risk factors. The age of a farmer, the life cycle of a farm and usage of credit seemed to be dependent on the assessment of the significance. Sonkkila (1996) questioned the significance of risk factors for Finnish farmers in 1993 and found that the most significant sources of uncertainly were demand for products, health of the farmer, costs, accidents, price level between inputs and outputs, as well as changes in agricultural policy. In the study, education and age of farmers, resources of the farm, and share of on-farm incomes of all incomes were dependent on the assessment of the significance. The results of both of these studies suggest that risk should be considered in a more comprehensive way than just price and yield risk, when measuring farmers' risk attitudes and developing risk management strategies.

Meuwissen et. al. (1999) studied risk perceptions of Dutch livestock farmers and found that the most significant sources of risk related to the meat price, epidemic animal diseases and the milk price. They found a significant relationship between perception of risk and several socio-economic and farm related variables. The results of the study were, however, influenced by the fact that it was carried out during a major outbreak of Classical Swine Fever. A 1996 USDA survey indicated that producers in the United States were most concerned about institutional risk, production risk and price risk (Harwood et. al. 1999). Crop farms were most concerned about production and price risk, while livestock farms regarded institutional risk as the most significant source of risk.

2.3 Risk management strategies in the farm business

Risk can be removed or reduced by institutional or farm-level measures. Institutional risk management measures are directly or indirectly part of the CAP and national agricultural policy. However, the primary objective of agricultural policy is not to reduce risk in the farm business. The introduction of these measures may in fact decrease risk for the farm business and, at the same time, increase risk in other areas or increase other sources of risk. Institutional measures affecting risk are not discussed in this context.

Sonka and Patrick (1984, 101) divide risk management in the farm business into two dimensions. The first deals with the utilisation of risk management strategies to prevent uncertainties or to reduce the impact of uncertainties on the farm, while the other relates to the acquisition of information about uncertainties and taking risk consciously into the decision-making process. Jolly (1983, 1107) states that risks

management equals farm management, because virtually all actions taken by a farm manager are subject to risk. Successful farm management depends on taking risk consistent with the goals and financial position of the farm (Nelson 1990, 38). Risk management strategies are commonly classified into marketing strategies, financial strategies, and production strategies (see, for instance, Boehlje and Trede 1977, 21; Sonka and Patrick 1984, 102-110).

Marketing strategies are used to reduce market risk. Spreading sales over time may reduce price variations and therefore lower price risk. Effective utilisation of spreading sales requires sufficient storage capacity and the acquisition and analysis of market information. Contract selling allocates marketing risk to both producer and buyer. Contract can apply to volume, price, quality, and time of outputs and inputs. However, contract selling with fixed volume decreases flexibility and thus increases production risk.

Forward pricing involves selling outputs in advance of delivery (Fleisher 1990, 87). Fleisher (1990, 88) groups methods of forward pricing into forward contracting, futures contracts and options. A forward contract is a binding contract determining price, quantity and quality for a specified future delivery. A futures contract is a binding obligation to buy or sell a specific commodity. An options contract is a right, but not an obligation to buy or sell a specific futures contract at a pre-specified price during a certain period of time. In principle, forward pricing methods are more flexible and involve less production risk than contract selling, but involve some extra costs (Boehlje and Trede 1977, 23). No common forward pricing market existed in Finland before the year 2000[2], so forward pricing methods could not be utilised by farmers during the first years in the EU. Nevertheless, increased market risk with regard to the completion of the target price system may require the establishment of various forward pricing mechanisms in Finland in the future.

Financial strategies can be used to reduce financial risk or the financial consequences of other sources of risk (Boehlje and Trede 1977, 21). However, financial risk management strategies to decrease financial risk may increase other sources of risk (Gabriel and Baker 1980, 563). Maintaining a credit reserve or unused borrowing capacity may protect the farm against unexpected losses. Maintaining adequate liquidity or working capital protects the farm business from financial crisis caused by unequal cash-flows or delays and falls in incomes. Maintaining adequate solvency as well as appropriate structure and terms of loans reduces financial risk as well. In order to meet financial commitments, the farm business has to be profitable at least in the long term.

[2] Avena Nordic Grain introduced a futures contract system for grain producers from the autumn of 2000 onwards.

Production strategies aim at diminishing production, technological and accident risks (Boehlje and Trede 1977, 21). Production risk can be reduced by selecting more secure enterprises that have stable or low variability in income, production and price. In addition, farmers may select relatively more or less risky ways of producing by, for instance, using or not using pests and fungicides in production (Hardaker et. al. 1997, 238).

The output of crop production is more variable than that of livestock, because crop production relies more on factors affected by production risk. The price variation is greater on those products which are not under the intervention mechanism, such as pork and oats. Utilisation of a stable enterprise selection method was very limited before 1995 in Finland, because the established permission and quota mechanisms prevented farmers from shifting to new enterprises. Such a move usually requires investments, which increases financial risk at least in the short term.

Diversification involves combining enterprises to reduce the variability of returns. Diversification is more effective if a negative or low positive correlation exists between returns of different enterprises, because losses in one enterprise can be compensated by returns in another (Sonka and Patrick 1984, 102). Diversification in family-farms should be considered as the total household income level rather than merely that at the farm level (Fleisher 1990, 72; Hardaker et. al. 1997, 240). Therefore, the increased amount of off-farm work by farm families reduces the variability of returns.

Flexibility refers to the ability to adapt to a changing operational environment by adjusting production or marketing decisions (Hardaker et. al. 1997, 240). Cost flexibility means that the share of variable costs of total costs is high. This can be achieved by leasing land and machinery, using custom operators, and co-ownership of fixed means of production. Asset flexibility means investing in assets having more than one use. For example, some farm buildings may be easier to modify to an alternative use than others. Product flexibility exists when an enterprise produces a product that has more than one end use, or when an enterprise produces more than one product. For example, certain barley varieties can be used both for malt and feed. Market flexibility refers to the situation where a product can be sold in different markets, and which may not be subject to the same risks. For instance, risks in the domestic market may be different from an export market. Time flexibility relates to the speed with which adjustments to the farming operations can be made. Producing products with short production cycles instead of long ones increases time flexibility.

Insurance protects a farm against unexpected damages, accidents, casualties and liability. In Finland, the government partly covers income losses due to crop

failures via crop damage subsidies while farmers in most other countries may take out a crop insurance policy for protection against crop failures.

In the Patrick et. al (1985) survey, US farmers assessed pacing investment and expansion, obtaining market information, enterprise diversification, spreading sales and fund reserves as the most important management responses to risk. Sonkkila's (1996) study indicated that the most important methods of risk management among Finnish farmers were financial strategies. Meuwissen et. al. (1999) reported that Dutch livestock farmers regarded producing at the lowest possible costs, buying business/personal insurance, applying strict hygiene rules and increasing their solvency ratio as the most important strategies of risk management. According to Harwood et. al. (1999), farmers tended to combine various risk management strategies.

3. Decision-making

3.1 Point of views when examining decision-making

3.1.1 Economic and psychological approaches to decision-making

Decision-making has been widely discussed in several disciplines using a variety of approaches, methodology, and point of views. The economic view has generally been limited to examining decision-making within an economic activity, where the primary interest has been the outcome of decision-making on an aggregate level, and that the behaviour is consistent with a rationality paradigm. On the other hand, psychology is interested in the decision-making of individual persons in general, and on the decision-making process (Hogarth and Reder 1987, 4-9). According to Veldhoven (1998, 47), the discipline of psychology is inductive and empirically oriented. However, the points of view have slightly converged, when behavioural economics has adopted methods and ideas from psychological research and the field of economic psychology has offered interesting problems for psychological research (Wärneryd 1988, 4).

3.1.2 A static and dynamic view of decision-making

Decision-making can be perceived from a static and the dynamic point of view. The static point of view emphasises the components of decision-making, while the dynamic point of view underlies the decision-making process (Zeleny 1982, 84). The components of decision-making can be divided into decision-maker, objectives, alternatives, operational environment, and the hesitation of a decision-maker in a choice situation (Churchman et. al. 1957; Jääskeläinen and Kuusi 1985, 38).

In the dynamic view, decision-making is divided into phases. The dynamic view emphasises that the decision-making process is not necessarily straightforward but can consist of iteration between the phases. Theory and various studies about dynamic decision-making differ in the questions of how detailed the phases of decision-making are defined, and what the relationship between decision-making and management is. Turban and Meredith (1981, 20) define decision-making as a process by which the decision-maker chooses between two or more alternative courses of action for the purpose of attaining specific goals. A general definition for farm management, derived from the theory of firm, states that farm management is the allocation of limited resources to maximise the farm family's satisfaction (Boeljhe and Eidman 1984, 14). Castle et. al. (1987, 3) suggest that farm manage-

ment is concerned with the decisions that affect the profitability of the farm. Giles and Renborg (1990, 400-401) have observed four items that are characteristics of farm management: the totality of the job, the management job is not so different from other businesses, there are several, often conflicting objectives, which can be difficult to identify and quantify precisely, and the need to ensure the continuity of the business.

Gasson and Errington (1993, 18) underline the specific role and behaviour of the family farm business compared with a non-family business. Potter and Lobley (1992) suggest that the succession status of the farm family household is an important factor to determine the way farm businesses develop over time. According to Gasson and Errington, the key elements of a farm family business consist of:

1. Business ownership is combined with managerial control in the hands of the business principals.
2. These principals are related by kinship or marriage.
3. Family members provide capital for the business.
4. Family members do the farm work.
5. Business ownership and managerial control are transferred between the generations.
6. The family lives on the farm.

Simon (1977, 43) divides the phases of decision-making into intelligence, design, choice and review, and emphases that each phase is itself a complex decision-making process. Castle et. al. (1987, 4-6) define the decision-making as comprising the following steps: setting goals, recognising the problem, obtaining information, considering the alternatives, making the decision, taking action, accepting responsibility and evaluating the decision. Öhlmer et. al. (1998) tested farmers' decision-making processes through case studies and suggested that the conceptual model of the decision process consists of four phases and four sub-processes. The phases are problem detection, problem definition, analysis and choice, and implementation. The sub-processes are searching and paying attention, planning, evaluating and choosing, and checking the choice. Simon, Castle et. al. and Öhlmer et. al. define decision-making broadly to comprise the whole management process. For this reason, Simon (1977, 39) defines decision-making as synonymous with management. In this study, decision-making is also broadly defined as a synonym for management.

3.1.3 Multiple criteria decision-making

Holloway (1979, 5) lists four factors that combine to make a complex decision problem: a large number of factors, more than one decision-maker, multiple objectives, and uncertainty. Friedman (1962, 6) classifies decision problems as

technological and economic problems; a technological problem exists when resources are scarce and the problem can be solved by using only one criteria. An economic problem arises, when scarce resources are used to satisfy several criteria. Similarly, Zeleny (1982, 26-30) states that a technological (single criteria) decision problem only consists of the process of search and measurement, whilst an economic (multiple criteria) decision problem presumes the decision-maker's involvement in the decision-making by using human judgement and values, assessment of trade-offs, learning, creativity, and persuasion. Technological decision problems appear commonly at an operational level, whereas tactical and especially strategic level decisions are generally economic in nature. The longer the decision period, the fewer the constraints in a decision problem, thus the division between objectives and constraints is flexible (see Romero and Rehman 1989, 5; Korhonen and Wallenius 1990, 245).

Multiple criteria decision-making (MCDM) is a sub-field of operations research studying generally a single decision-maker involved in solving a number of alternatives using multiple criteria (Dyer et. al. 1990, 647; Korhonen 1998, 1). The alternatives may involve risk and uncertainty, and the criteria may be partly or fully conflicting and qualitative. Conflicting criteria do not allow the decision-maker to reach an optimal solution maximising simultaneously all the criteria; instead it allows for rather efficient solutions whereupon it is not possible to improve any other objective without sacrificing one or more of the other objectives (Shin and Ravindran 1991, 97). In addition, the best compromise solution is an efficient solution that maximises the decision-maker's preference function (Shin and Ravindran 1991, 98). Therefore, the preferences of the decision-maker have to be known either directly or indirectly in a multiple criteria decision situation. Korhonen (1998, 1) emphasises the importance of structuring a problem, because MCDM-problems are seldom well-structured.

Regardless of the growing number of MCDM-applications in the field of business, only a few multiple criteria decision-making models have been applied to agriculture. Some applications exists, for instance, in the area of land usage and allocation, regional planning and production planning (Romero and Rehman 1989, 10).

3.1.4 Strategic decision-making

The hierarchy of the decisions can be classified at an operational, tactical and strategic level. The hierarchy can also be associated to the time dimension of the decision; in general, the more strategic the decision, the longer the time dimension and the less current means of production limit the decision-making. According to Hofer and Schendel (1978, 4) strategy is a means to adjust to the operational environment by reallocating resources in order to assure the achievement of the

objectives, whereas on the tactical and operational level, the aim is to operate as effectively as possible in order to achieve the objectives. Jauch and Glueck (1988, 11) characterise a strategy as a unified, comprehensive, and integrated plan that relates the strategic advantages of the firm to the challenges of the environment. Mintzberg et. al. (1976, 246) simply state that strategic means important, in terms of action taken, the resources committed, or the precedents set.

Porter (1998a, 4) states that the competitive structure of an industry is determined by five forces: the threat of new entrants, the threat of substitute products and services, the bargaining power of suppliers, the bargaining power of buyers and rivalry among existing farms. Firms may gain a competitive advantage in an industry by choosing among four generic strategies: cost leadership, differentiation, cost focus and differentiation focus (Porter 1998b, 11-12). Rockart (1979, 86) introduces the concept of critical success factors and identifies four prime sources of critical success factors: the structure of industry, the competitive strategy of the firm, the factors of operational environment and temporal factors.

The strategic gap has turned out to be a simple but useful concept to illustrate the meaning of strategy in decision-making (Jauch and Glueck 1988, 65-66). Figure 3.1 demonstrates that an enterprise is currently (time t_1) at point A, and it aims at point C in the future (time t_2). However, pursuing current strategy leads the enterprise to point B, which is not desirable. The difference between the target result (C) and the expected result (B) is called a strategic gap[1].

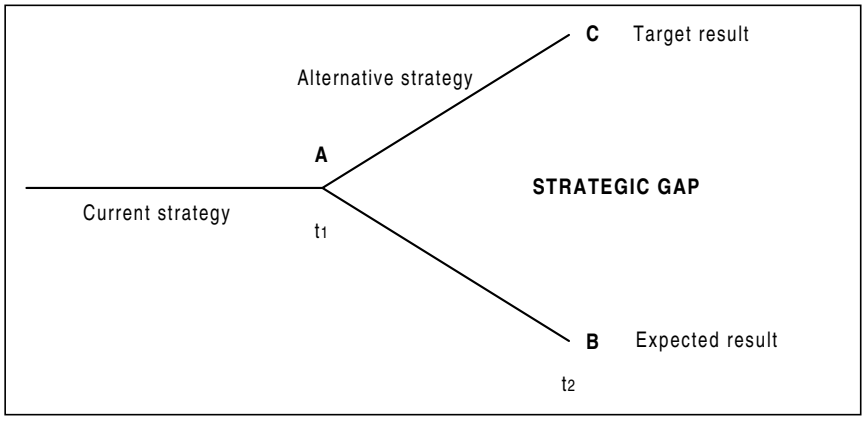

Figure 3.1 Strategic gap

[1] Decision problem can be used in general as a synonym to the strategic gap, although strategic gap refers to the strategic decisions. Castle et. al. (1987, 5) define decision problem as a discrepancy between goals and what is actually achieved. Anderson et. al. (1977) state that decision problem exists when possible consequences of decision are important and the best choice is not obvious.

The strategic gap may be reduced either by altering the strategy or by adjusting the goal. If the gap is significant, important and reducible, alternative strategy can shift the expected result closer to the desired state. If the gap is significant and important but nor reducible, the goal has to be lowered to reduce the gap. Correspondingly, if the gap is significant, reducible but not important, the goal may be lowered. Prioritisation of objectives plays an essential role in the analysis, because all goals cannot be reached at the same time.

The hierarchy of the decision can be also associated with the structure of the decision. Programmed or structured decisions are repetitive and routine, and have a definite procedure of treatment, whereas non-programmed or unstructured decisions are novel and usually consequential, and no predetermined or explicit procedure exists for dealing with them (Simon 1977, 46). According to Simon, every decision problem can be classified between programmed and non-programmed decisions. In this study, a strategic decision is defined as an unstructured, long-term reallocation decision relating to the adjustment into the operational environment. Accordingly, strategic decision-making means decision-making dealing with strategic decisions.

3.1.5 Basic decision problems in farm management

The basic decision problem for a farm is the allocation of resources: what and how much to produce, how to produce, and whom to produce for. Carson (1988, 91) states that because of the many changes that affect these questions over time, this basic decision process is continuous. In family-farms, allocation also concerns non-agricultural production, so, for instance, paid work can be regarded as one of the products of the farm. Boehlje and Eidman (1984, 9-13) emphasise the importance of the life cycle of the farm and farmer in the management of family-farms.

The basic alternatives of the allocation decision on the farm may be classified as maintaining current production, extending current production, reducing current production, changing the current production line, introducing additional processing for agricultural products, increasing off-farm incomes, or quitting farming. The farmer may also use combinations of these alternatives. The decision on the adjustment into the EU can be regarded as a strategic decision, because it is a long-term, unstructured multiple objective decision related to the adjustment into the operational environment. It deals with all questions relating to the basic decision problem and involves many uncertainties. Furthermore, the changes in the operational environment in the EU lead to a strategic gap, which is significant and important but is however reducible for farmers.

3.2 Theoretical approaches to decision-making

3.2.1 Rational decision-making

Several schools of thought and scientists have studied decision-making using a variety of approaches and classifications. Keen and Scott Morton (1978, 61-77) divide the approaches of decision-making into five classes: rational decision-making, bounded rationality, decision-making as an organisational process, decision-making as a political process and the decision-maker as individual. These concepts of decision-making also range from the entirely normative to entirely descriptive[2].

The concept of rationality is not distinct; it has been defined differently in various papers and discussions. Therefore, it may be useful to distinguish and interpret the broad meaning of rationality as referring to a paradigm of rationality, and the specific meaning of rationality as referring to a specific theory. Neo-classical decision theory has been used as an operational definition of rationality (Hogarth and Reder 1987, 4). The foundations of decision theory are based on Ramsey's, Von Neumann's and Morgenstern's as well as Savage's research (Fishburn 1989, 387). The rational view of decision-making, dominating neo-classical microeconomic theory, is highly normative, is based on theorems and focuses on the logic of optimal choice (Keen and Scott Morton 1978, 64). Rational behaviour presumes that (Cyert and March 1963, 8; Hogarth and Reder 1987, 2; Blaug 1992, 229)

1. The decision-maker aims at maximising his objectives.
2. Each alternative and its consequences are known. If a decision problem includes uncertainty, the probabilities are known.
3. The decision-maker has a preference or a utility system, which permits him to rank all sets of consequences and to chose the most preferred alternative.

The definition of rationality states that the decision-maker is solving a constrained maximisation problem. Though rationality is the idealisation of practical decision-making, it provides a comprehensive framework to study and test decision-making (Einhorn and Hogarth 1987, 42; Brandes 1989, 338). A rational expectations model, commonly used in econometric analysis, is based on the hypothesis that the economy generally does not waste information and that the expectations depend specifically on the structure of the entire system (Muth 1961, 315). Several studies of the expectations and rationality of agricultural producers have been conducted but the results have been rather contradictory (Irwin and Thraen 1993, 115).

[2] The normative approach determines how decision-making should take place, whereas the descriptive approach strives to describe and explain how decision-making takes place in reality.

The expected utility model is a normative model of rational behaviour under risk and uncertainty (Robinson et. al. 1984, 12-13). The expected utility model presumes that the decision-maker assigns an appropriate utility for each consequence, summarises the utility of all consequences into one utility measurement and then chooses an alternative with the highest expected utility (Keeney and Raiffa 1976, 131). In the model, the utilities of outcomes are weighted by their probabilities (Kahneman and Tversky 1979, 265). Officer and Anderson (1968, 13-14) state that because risk is associated with most of the decisions, pure profit as a maximisation criterion is not consistent with rational behaviour. The expected utility model is based on five axioms about individual behaviour (Von Neumann and Morgenstern 1994; see also Robinson et. al. 1984, 13; Copeland and Weston 1988, 79-80)[3].

The expected utility model is commonly illustrated by a utility function, which illustrates decision-makers' attitudes toward risk. A concave utility function implies risk aversion, a linear function implies risk neutrality and a convex function implies risk preference. Decision-makers' utility functions have been estimated in empirical studies by asking individuals game-type questions. In practice, problems have arisen as the subjects did not take the exercise seriously due to the artificial nature of the game situation (Kreps 1988, 191-192).

Allais (1953) introduced the first and perhaps most famous paradox, which stated that decision-makers violate the axioms of the expected utility model. He indicated that decision-makers violate the independence axiom. Similar kinds of results have been reported by Kahneman and Tversky (1979). They criticised the expected utility model by presenting several choice problems, which systematically defied the axioms of the model. They reported that people utilise the certainty and reflection effect when they weighted certain outcomes and were more risk averse in

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[3] 1) Comparability
$X > Y$, $X < Y$ or $X \sim Y$
Where X and Y are outcomes and >, < and ~ mean preference.

2) Transitivity
If $X > Y$ and $Y > Z$, then $X > Z$. Correspondingly, if $X \sim Y$ and $Y \sim Z$, then $X \sim Z$.
Where X, Y and Z are outcomes.

3) Independence
If $X \sim Y$, then $G(X, Z: \alpha) \sim G(Y,Z: \alpha)$.
Where $G(X,Z: \alpha)$ means a gamble, where probability of receiving outcome X is α and a probability of receiving outcome Z is $(1-\alpha)$. Similar interpretation concerns $G(Y,Z: \alpha)$.

4) Measurability
If $X > Y \geq Z$ or $X \geq Y > Z$, then there exists a unique α, such that $Y \sim G(X, Y: \alpha)$.
Where X, Y and Z are outcomes and $G(X,Y: \alpha)$ means a gamble, where probability of receiving outcome X is α.

5) Ranking
If $X \geq Y \geq Z$ and $X \geq U \geq Z$, then if $Y \sim G(X,Z: \alpha_1)$ and $U \sim G(X,Z: \alpha_2)$, it follows that if $\alpha_1 > \alpha_2$, then $Y > U$, or if $\alpha_1 = \alpha_2$, then $Y \sim U$.
Where X, Y, Z and U are outcomes and $G(X,Y: \alpha_1)$ means a gamble, where probability of receiving outcome X is α_1.

a loss situation than in a gain situation. Secondly, they reported that people utilised the isolation effect, where they often disregarded components that the alternatives shared and focused on the distinguishing components. The isolation effect leads to inconsistent preferences when the same choice is presented in different forms. Kahneman and Tversky (1979, 279) developed a prospect theory as an alternative for the expected utility model. In the prospect theory, the value function is defined through deviations from the reference point; the value function is generally concave for gains and commonly convex for losses, and the value function for losses is steeper than the value function for gains. For instance, Korhonen et. al (1990) have observed behaviour, which is consistent with the prospect theory.

3.2.2 Bounded rationality

The bounded rationality theory has offered an alternative to the rational decision-making theory since the 1950s by criticising the presumptions of rationality and presenting empirical arguments against it (Simon 1979, 503). In real decision situations, the decision-maker's knowledge may be incomplete; objectives, alternatives, outcomes, probabilities of outcomes, or decision criteria may be partly or fully incomplete or unknown. Therefore, the decision-maker is unable to make a rational decision due to the limitations of data processing. Decision-makers may utilise heuristic methods to gain a satisfactory result. Tversky and Kahneman (1974) have shown that to reduce complex tasks people employ three heuristic methods in making judgements under uncertainty: representativeness, availability, as well as adjustment and anchoring. Korhonen et. al. (1990, 177) state that it is important to pay attention to framing a problem to avoid discrepancies and bias. Also Winkler (1982, 519) emphasises the existing gap between identification as well as structuring the problem and solving it.

Hodgson (1985, 831) criticises rationality but states that by adopting an hierarchical decision-making model decision-makers could better control the complexity and computational demand of the decision problem. Simon (1978, 8-9) argues that the traditional view of rationality, substantive rationality, is static and only takes into account the extent to which appropriate courses are chosen. According to Simon, the effectiveness of procedures used to choose the actions, procedural rationality, should be taken into account.

The profit maximisation presumption of the rationality has been under particular criticism, because, even if a firm or an entrepreneur strives to maximise its or his profit, it may not be possible to maximise due to a lack of information or limited time (see, for instance, Simon 1959, 262; Leibenstein 1979, 494; Gillmor 1986, 20; Sloman 1991, 244-247). In addition, the time period of the decision greatly affects goals, and the goals may alter during different time periods in the life cycle of a

firm. This is especially characteristic of small family firms or family farms, where the life cycle is very determinant on the decision-making. Furthermore, except profit, the firm may have other objectives, like growth, maintaining solvency, adequate liquidity, increasing market share, survival or objectives related to social and authority aspects. These objectives may conflict with profit maximisation. Drucker (1974, 100) notes that business management means the balancing of a variety of needs and goals, which requires multiple objectives. On the other hand, Leibenstein (1976, 31) stresses that the firm itself is not a decision-making entity nor does it have objectives but the behaviour of the firm constitutes individual behaviour, interaction of individuals within groups and the behaviour of the groups.

Instead of maximising profit, achieving sufficient and adequate profit while ensuring the continuity of operation has gained popularity (Honko 1985, 29). Simon (1979, 503) calls this kind of behaviour satisficing, where the decision-maker replaces the maximising of objectives to aspiration levels of objectives. The decision-maker terminates the search and chooses an alternative, when an alternative meets his aspiration level. However, Zeleny (1982, 63-64) states that maximisation is not incompatible with bounded rationality, because bounded rationality may be an additional constraint in an optimising problem. Zeleny considers this kind of approach to bounded optimality, and argues that satisfactory solutions are the result of bounded optimisation. Zionts (1992, 567) states that the bounded rationality may be thought of as part of multiple criteria decision-making.

Simon (1982, 112-114) distinguishes objective (ex post) and subjective (ex ante) rationality as well. Objective rationality is actually the right kind of behaviour, which maximises particular values in certain situations, while subjective rationality refers to maximising values in relation to the decision-maker's knowledge at the moment he makes the decision. Singh (1987, 444) also emphasises the distinction between objective and subjective rationality, and continues that Muth's concept of rationality suffers from this objective rationality fallacy.

In the result of the critics against rationality, rationality has various meanings in theory, and the original definition and assumptions have been specified, modified and expanded to better represent the real decision-making (Keen and Scott Morton 1978, 64; Singh 1987, 449-450; Brandes 1989, 333). Simon (1987, 38) have also criticised these additional assumptions, since they are very central and are moreover empirically unverified. The discussion about rationality is interminable according to Boland (1981, 1034), because either the hypothesis of maximisation or the contra-argument against it cannot be logically tested.

3.2.3 Decision-making as an organisational process

Decision-making as an organisational process, based on Cyert and March's (1963) book "A Behavioural Theory of the Firm", emphasises the formal and informal structure of the organisation, standard operating procedures of a firm, and the channels of communication in the economic behaviour of a firm. Formal and informal coalitions in the firm have their own priorities, goals and focus of interest. Organisational decision-making involves bargaining and negotiating between these groups (Keen and Scott Morton 1978, 69).

3.2.4 Decision-making as a political process

Decision-making as a political process emphasises the decision-making as a bargaining process between organisational units, where decision-making is mostly determined by the power and influence of the units (Keen and Scott Morton 1978, 63). The view is pluralistic and especially stresses strategic and political level decision-making, where decisions are made in relation to political constraints, aspirations and interactions, and where decision-making involves multiple goals, values and interest in the organisation (Allison 1971, 144). This kind of decision-making is not predictable or controllable.

3.2.5 The decision-maker as an individual

One of the fundamental propositions in psychology is that human behaviour is influenced both by the person and the environment. As applied to the decision-making, this suggests that the individual characteristics of decision-makers in various decision situations produce different outcomes (Gasson 1973, 521-522; Ruble and Cosier 1990, 283). The decision-maker as an individual emphasises personal problem-solving and information processing behaviour and ability, when the decision process and outcome is influenced by these characteristics (Keen and Scott Morton 1978, 73).

Gul (1984, 264) divides the individual differences into two related dimensions: personality and cognitive style. Personality refers to the attitudes or beliefs of the individual, while the cognitive style refers to the ways or methods by which an individual receives, stores, processes, and transmits information (Pratt 1980, 502). Personality and cognitive style can distinctly affect or interact with the decision-making, which is also verified by Gul (1984, 274-275) in his study. Correspondingly, Rougoor et. al. (1998) grouped the aspects of the farmers' managerial capacity into personal aspects and aspects of the decision-making process, and

noted that the role of the decision-making process has been omitted from studies on the role of management capacity in relation to the farm result.

Attitude means a relative enduring tendency to respond consistently to an object, person or event in either a favourable or unfavourable way (Wittig and Belkin 1990, 357). The decision-maker's attitudes toward risk has great importance in decision-making when there is risk and uncertainty. Farmers' attitudes toward risk and the probabilities they assign to future events often explain why similar producers make different decisions in uncertain situations (Fleisher 1990, 43).

The decision-maker is generally assumed to be risk averse (Anderson et. al 1977; Young 1979; Biswanger 1980; Hazell 1982). Biswanger (1980, 400) measured attitudes toward risk for Indian farmers by real gambling situations and concluded that 117 of 118 farmers had a nonlinear, risk averse utility function. Dillon and Scandizzo (1978, 434) tested peasant risk attitudes in Brazil and concluded that most of the peasants were risk averse but the level of risk aversion was diverse. In addition, the size of the farm, income level of the farmer and socioeconomic factors seemed to influence peasants' attitudes toward risk. Meuwissen et. al. (1999) concluded that farm characteristics, not farmer characteristics, distinguish between different risk attitudes. In their study, more risk averse farmers had significantly larger farms.

Steers (1988, 131) defines cognitive style as the way in which people process and organise information and arrive at judgements or conclusions based on their observations of situations. Individuals with a higher education level or living in urban environments are generally able to process more information and use more complex decision rules (Van Raaij 1988, 10). Giles and Renborg (1990, 404) emphasise the existence of a wide range of managerial styles and state that the performance gap can often be explained by the managerial style of the farmer.

Payne (1976) classifies the models of decision-making on the basis of the cognitive processing effort demanded as compensatory and non-compensatory models. In the compensatory models, the decision-maker makes trade-offs between the values of attributes, while in the non-compensatory models the relationship between attributes is not assessed. Payne (1976, 382) concludes that people tend to use compensatory models in simple decision situations which have a limited number of alternatives; if the decision-problem is complicated there are several alternatives; people aim at quickly eliminating some alternatives by using non-compensatory models. Thus, information processing by the decision-maker varies depending on the complexity of the task and the characteristics of the decision-maker. Ruble and Cosier (1990, 292) also found that the cognitive style may be task-contingent. The compensatory models, which demand higher cognitive processing than non-

compensatory models, are closer to the rational view of decision-making, whereas the non-compensatory models are closer to bounded rationality.

The objective has been defined as a target which a manager is willing to work toward (Castle et. al. 1987, 10). Zionts (1982, 5) defines the objective as something to be pursued to its fullest and that an objective generally indicates the direction of change desired. Öhlmer et. al. (1998, 275) define an objective as a thing which a manager has decided to strive for. Zeleny (1982, 15) states that objectives are closely identifiable with needs and desires. Objectives should also represent the values of decision-makers and they should be measurable (Giles and Renborg 1990, 407). Objectives depend on the decision situation, because they vary between decision-maker and time horizon (Gasson 1973, 524). In this study, an objective is defined as a desired end-state resulting from a planning activity.

Drucker (1974, 100) suggests that objectives should be set in eight key areas: marketing, innovation, human organisation, financial resources, physical resources, productivity, social responsibility and profit. According to Jauch and Glueck (1988, 65) objectives are needed to define the organisation in its environment, co-ordinating decisions and decision-makers, providing standards for assessing performance, and to concretise the mission statement. The choice and assessment of objectives is affected by operational environment, goals and values of the decision-maker, and the condition of the enterprise (Jauch and Glueck (1988, 66). The Balanced Scorecard approach, which became one of the leading business management approaches in the 1990s, states that objectives should be set in four perspectives: financial, customer, internal business process, and learning and growth (Kaplan and Norton 1996).

Farmers' objectives also depend on the characteristics of the farmer, the decision situation, and the condition of farm. Objectives may be adjusted as a response to events in the operational environment. The farmers' objectives are expected to change at different stages of the life cycle, because the relative importance of objectives is reflected by changes in wealth, the family situation, and age (Boehlje and Eidman 1984, 9; Carson 1988, 91). The objectives or prioritisation of objectives of the family may differ from the objectives of the farm, even though the distinction between family and farm objectives is not evident in a family-farm. However, as family-farms have generally one or two managers, the objectives of the family members may conflict and therefore affect the decision-making. Hamilton and Bryant (1956, 73) have noticed that limited resources increase tension between short and long term objectives, like increasing current consumption versus making new investments. Gasson and Errington (1993, 88) note the fact that in a family business the managers are related, and this has an influence on the way priorities are established and decisions are made.

The importance and assessment of farmers' objectives have been studied empirically in different countries. Gasson (1973) interviewed British farmers and explored their range of values and objectives. Independence and the way of life turn out to be the most important values. Instrumental and social values were more important to bigger rather than smaller farms, while smaller farms considered intrinsic values as more important than bigger farms.

Gillmor (1996) repeated the questionnaire of Gasson's study for Irish farmers, and also compared the results regionally. Intrinsic and instrumental values were considered more important than social and expressive values. The most important values were doing work one likes, making a satisfactory income and independence. Gillmor did not observe statistically significant differences in the goal orientations on the basis of production line, farm size, age, marital status, education level, or full-time involvement.

Harper and Eastman (1980) evaluated goal hierarchies of small farms in New Mexico in the United States. They subdivided the goals into goals for the family unit and goals for the agricultural enterprise. Quality of life was the most important goal in both categories. The second and third important agricultural goals were to remain in agriculture and to avoid low profit/high loss. An important observation was that family and agricultural goals were compatible and nearly congruent, thus the farm family seemed to be a relevant unit of analysis rather than a farm enterprise.

Smith and Capstick (1976) evaluated management goals in Arkansas, in the United States. They interviewed farmers and used a paired-comparison method in the analysis. Staying in business and stabilising income were the most preferred objectives, while increasing farm size and increasing net worth were the least preferred objectives. Furthermore, the result of the study indicated that farmers were risk averse. Smith and Capstick concluded that multiple objectives are required in economic and financial planning as well as decision models.

Huirne et. al. (1993) used the workshop method to assess the goals of swine and dairy farms in Holland. The most important goals for dairy farmers were efficient production, realisation of optimal technical results, optimal treatment of animals, and ensuring long term profitability. Swine farmers prioritised the most efficient production, realisation of optimal technical results, ensuring long term profitability, and producing high quality products. Thus the most important goals did not differ much between swine and dairy farms.

Sonkkila (1996) evaluated objectives and values of Finnish farmers. The most important objectives were the farmers' health and objectives related to risk

management. Independence, variety in work, a healthy way of life, and the possibility to do the work one likes were the most important values.

Hahtola (1971) studied forest owners' decision making and concluded that multiple objective models correspond better to the empirical reality of forest owners' behaviour. The significant factors in the forest owner's decision-making seemed to be to gain adequate interest on capital, to ensure liquidity and economic safety, to ensure employment opportunities for the family among the family type of forest owners and objectives related to recreation. Karppinen (1999) classified forest owners as four groups on the basis of their goals (multiple objective owners, recreation users, those who get their livelihood from the forest and those who emphasise the forest as economic security), and noted that the objectives affected the economic behaviour of forest owners.

Value according to Allardt (1973, 28) represents something which is worth pursuing, which is scarce, or which does not always exist. Gasson (1973, 524) defines value as a conception of the desirable referring to any aspect of a situation, object or event that has a preferential implication of being good or bad, right or wrong. According to Öhlmer et. al. (1998, 275), values refer to the goodness or badness of something. Values are tied up with culture, thus the results of studies referring to values cannot be generalised without difficulty in different countries. Values are self-sufficient ends in themselves, even though some of the values are very close to goals and serve therefore as a means to attain a more desired end. Therefore, values are regarded to be permanent even in regard to the changes in time and circumstances. In this study, values mean the principles and beliefs of a person in relation to the goodness, badness or importance factor of something.

Gasson (1973, 527) classifies values into 1) instrumental, where farming is viewed as a means of obtaining income and security with pleasant working conditions; 2) social, where farming is practised for the sake of an interpersonal relationship in work; 3) expressive, where farming is a means of self-expression or personal fulfilment; and 4) intrinsic, where farming is valued as an activity in its own right. Values are organised in value orientations, which prescribe socially accepted norms to gain the objectives (Gasson 1973, 525). The concepts of role and norm are closely tied to values. Norms determine general rules of behaviour for roles, and correspondingly values provide an rational basis for norms (Katz and Kahn 1978, 431).

Need can be defined as a physiological or psychological deficit of something, or more specifically, a condition for which satisfaction is desired (Wittig and Belkin 1990, 414). Allardt (1976, 22-23) considers need as a two-dimensional concept; by satisfying one's need people strive to accomplish a certain goal but on the other hand, the existence of a goal is found by examining people's needs. Maslow's

(1954) theory of needs states that needs are universal and can be presented as a pyramid. From the base to the top these needs consist of survival and subsistence, safety and security, affection and belonging, recognition and esteem as well as self-fulfilment. According to Maslow, lower needs must be at least partially satisfied before an individual can recognise higher needs. The motivation of an individual can be gained only from ungratified needs. Hogarth (1980, 59) notes as well that people make choices in attempts to satisfy needs but needs are often expressed in the form of goals, which direct the decision-making. To conclude, needs affect people's behaviour via conscious or unconscious objectives.

Motivation refers to the conditions that initiate, guide, and maintain behaviour, usually until some goal is reached (Wittig and Belkin 1990, 142). Motivation has a central role in all behaviour. In psychological theory, the motive of action originate from needs, and the action terminates when the need is satisfied (Simon 1959, 262-263). Thus the needs and consequently objectives affect the motives.

Decision-makers form expectations about future events or changes, which are based on known empirical interdependence and information about the situation (Simon 1982, 106). Farmers' expectations may concern, for instance, forthcoming product prices, amount of yield in the next harvesting period, the level of adjusted interest in the next repayment stage, or level of support for a certain product. The anticipation of these future events influence the decision-making. Andersson and Bengtsson (1993, 18) argue that expectation formation is of relevance for short and medium term decision problems. The models of expectation can be divided into naive, adaptive and rational models. The models differ by the amount of information assumed to be possessed by the decision-makers (Irwin and Thraen 1993, 85). In the naive and adaptive model only past information is utilised, whereas in the rational model expectations are based on all available information at the present state.

Figure 3.2 illustrates a general level scheme of the individual factors affecting decision-making and the interrelationship between the factors. It can be noted, for instance, that both values and needs affect objectives, and this has an influence on the decision-making. In practice, the relationship between the factors can be much more complicated, thus the figure is simplified when presenting the major interrelationship between the factors. In addition the magnitude of the factors alters in different decision situations.

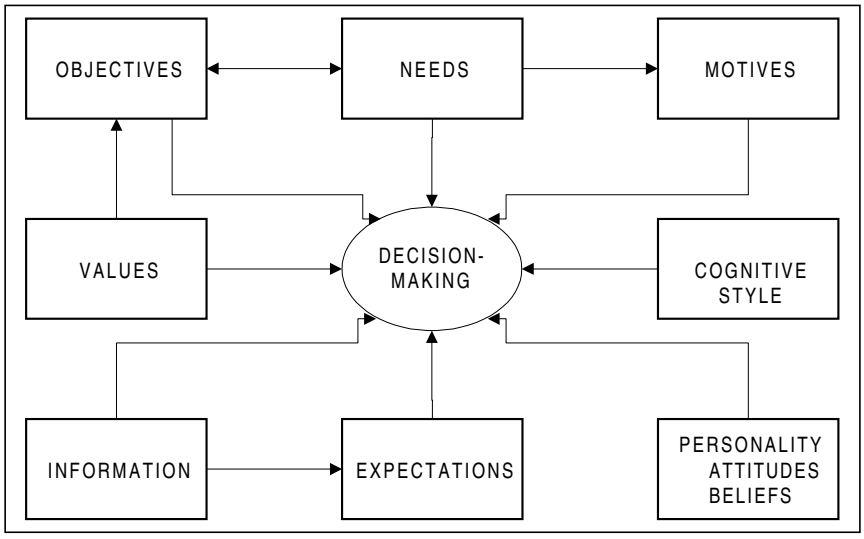

Figure 3.2. Factors affecting decision-making

4. Theoretical and operational model for the study

4.1 Theoretical model

The theoretical model of the study is illustrated in Figure 4.1. The model is based on the theory presented in Chapters 2 and 3, and has been modified and developed from the model of decision-making of a farmer within the farm system according to the results of Sonkkila's licentiate study (Sonkkila 1996). Factors which turn out not to be significant to the model are not included in the theoretical model. The location of a farm is included in the theoretical model, because since 1995 it is one of the factors determining the level of support even though it did not appear to be a significant factor in the model of decision-making of the farmer within the farm system. In addition, the theoretical model of this study focuses on strategic decision-making instead of general decision-making in a farm system. The aim is to explain the factors affecting strategic decision-making[1]. The dynamics in the model are due to the changes in the operational environment, which influence other components of the model. Moreover, the interaction between the components in the model make the model dynamic as well.

The components of the model consist of production factors, economic factors, farmer (decision-maker), strategic decision-making, and operational environment. The components correspond to the model of the farmers' strategic decision process, where the components are the farm's external environment, the farm, the farmer, and the problem (see Öhlmer et. al. 1993, 21). Production factors of a farm are characterised by resources, production line, diversity of production, effectiveness of production, and the location of the farm. Correspondingly, economic factors are determined by incomes, debts and expenditure. The farmer operates in a farm business and manages production and economic factors by making decisions. Production factors are managed by deciding what and how much to produce, how to produce and when to produce.

The farmer manages economic factors by determining when and whom to buy or sell to, how to manage the liquidity and solvency of the farm and how to take care of profitable production. Strategic decisions can be characterised as unstructured, multiple objective and stochastic long-term decisions aimed at reducing the strategic gap. The farmer bases his decisions on objectives and values, takes the production and economic factors of the farm and expectations of these factors into

[1] In Sonkkila's licentiate study the focus was to define how objectives, values, attitudes toward risk, uncertainty factors and risk management strategies were associated with the characteristic of a farmer and the farm. If dependency was found, it was expected that the characteristics of the farmer or the farm were affecting the decision-making within a farm system either directly or indirectly (Sonkkila 1996, 4).

account in the decision-making, and his personality, cognitive style, motives and needs influence the decision.

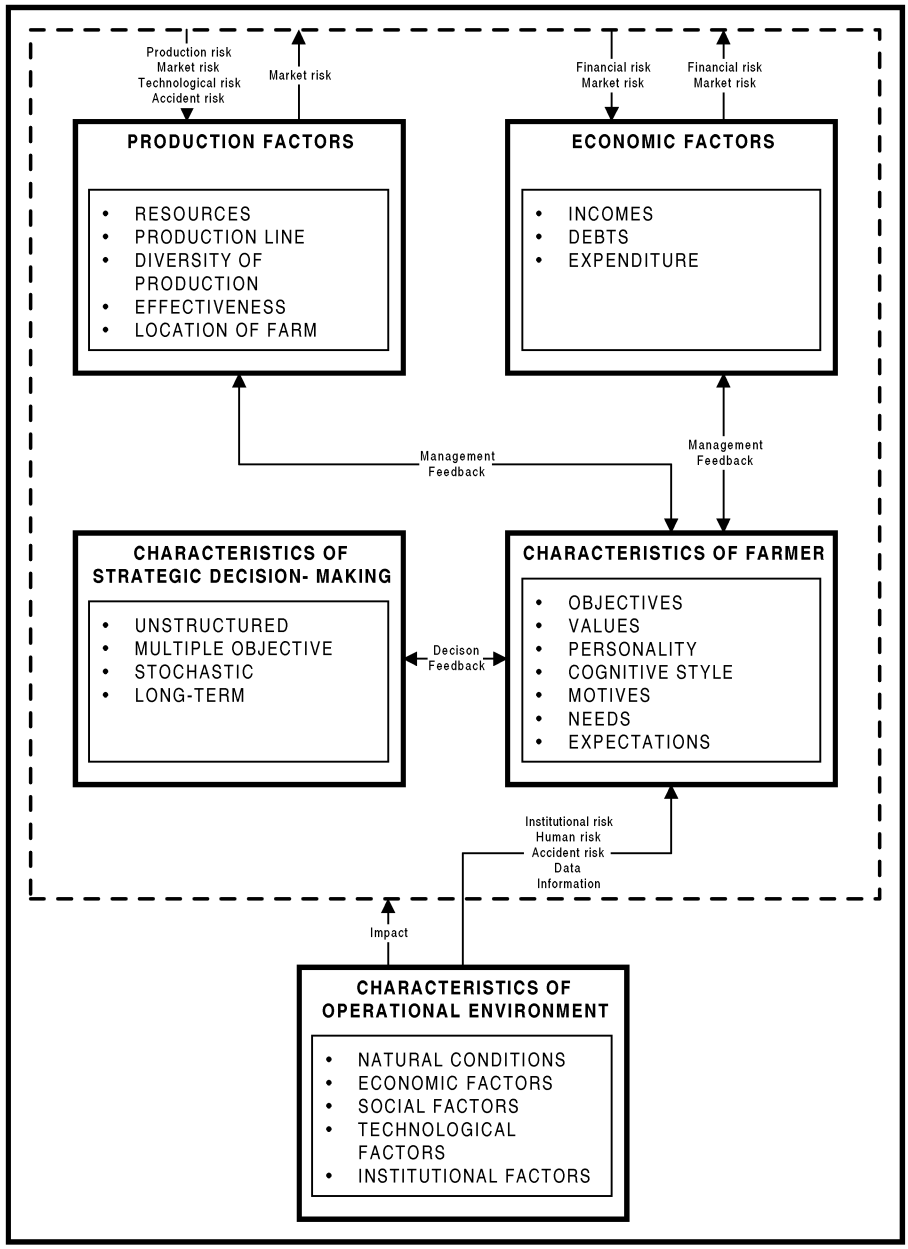

Figure 4.1 Theoretical model

A farm business as an open system is affected by the operational environment, which consists of natural conditions, as well as economic, social, technological, and institutional factors. These elements have an impact on the production and

economic factors of the farm business, and directly affect the farmer by causing risk and uncertainty to the processes. The farmer has to assess the impact by collecting data and information from the environment, and by taking the data and information from the operational environment into account in the decision-making process.

4.2 Operational model

In the context of the study, the theoretical model is operationalised[2] to the farmers' decision-making in regard to adjustment into the EU. The better the theoretical and operational concepts match, the better the validity[3] of the model is. In addition, good validity requires good reliability[4]. While reliability is basically an empirical issue, validity is usually more of a theoretically oriented issue referring to the question "Valid for what purpose?" (Carmines and Zeller 1979, 16). Thus, the validation of the measuring instrument is done in relation to the purpose for which it is being used.

The operational model is presented in Figure 4.2. The time period in the operational model is five years (1993-1998), although another five year period (1998-2002) is examined as well. The strategic gap (decision problem) is due to changes in the operational environment before and after joining the EU.

In this study, the decision-making process of how farmers' end up with a particular decision to adjustment is not studied. This would have required a completely different approach and method of study, and would not produce as comprehensive an examination as accomplished in this study. Another reason is that the strategic decision-making process may be long, even as long as several years and thus difficult to observe. For instance, (Öhlmer et. al. 1993, 55) observed a high variance in the time of problem detection, which is the starting point of the decision process. In addition, the decision process may be unconscious for some farmers or some farmers may not yet have made a clear decision.

Most of the factors presented in the theoretical model are included in the operational model. Some factors are not operationalised, because this would have required different survey methods (motives, needs, expectations) or the validity of the measures would have been too low (expenditure). However, some factors, like needs, can be studied through other factors of the model, because they are linked.

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[2] Operationalisation refers to linking theoretical concepts to the real world (Uusitalo 1991, 85).
[3] Validity describes the ability of measures to correspond to what they are intended to measure (Valkonen 1976, 67).
[4] Reliability means the ability of measure to give non-random results, or the same results on repeated trials (Carmines and Zeller 1979, 11).

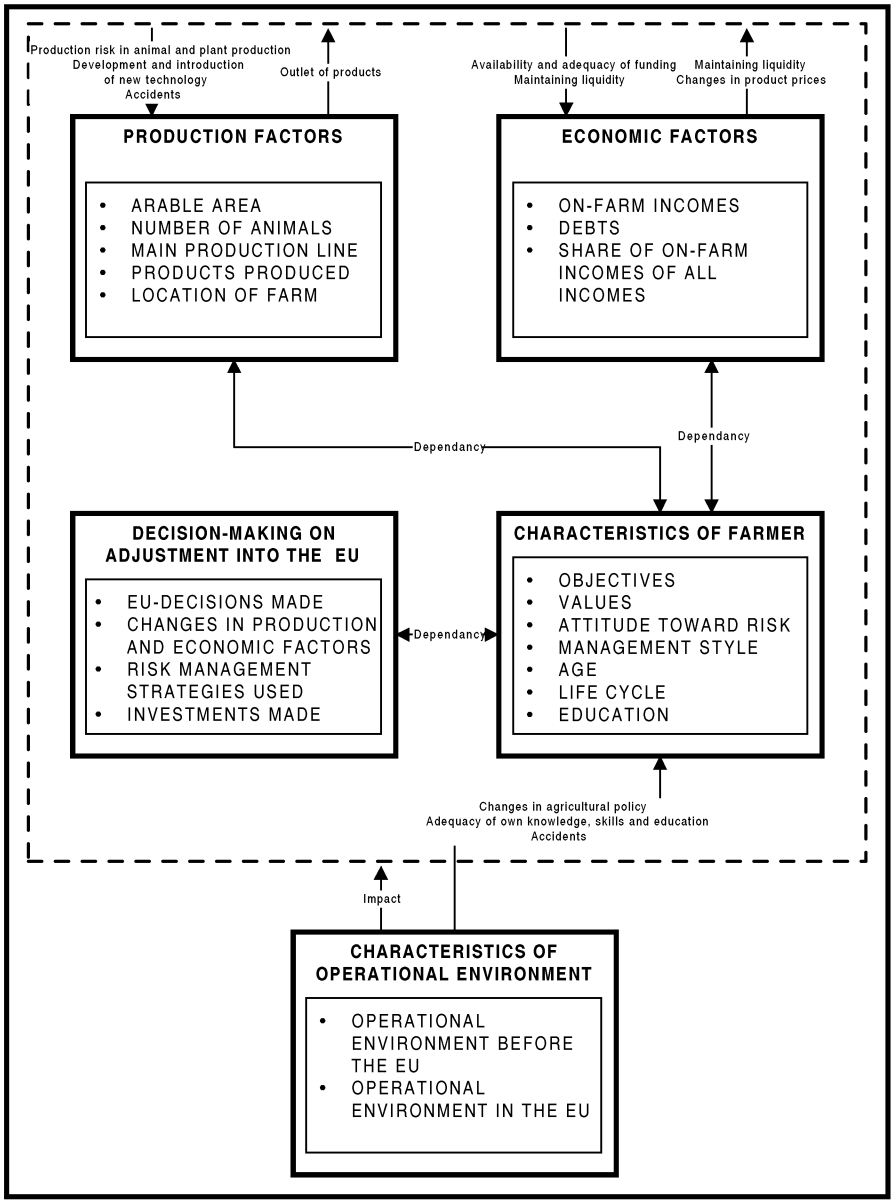

Figure 4.2 Operational model

In the model, the elements of the production factors are measured by arable area, number of animals, main production line, type of agricultural products produced, and location of farm. Likewise, economic factors are measured by on-farm incomes, debts as well as the share of on-farm incomes of all incomes. Production and economic variables measure concrete data, thus the reliability and validity of the variables can be expected to be good (Valkonen 1976, 66).

Operational factors associated with the farmer are objectives, values, attitudes toward risk, management style, age, life cycle, the assurance of a successor, and education. Age, life cycle and education measure concrete data, whereas objectives, values, attitudes toward risk, assurance of a successor and partly management style require the farmers' assessment, and consequently the reliability of these variables is lower than that of variables measuring concrete data (Valkonen 1976, 66). Part of the management style questions concern farmers' frequency of behaviour. The reliability of these variables depends on the accuracy of questions, and on the character of the behaviour; it can at its best be as good as the reliability of the variables measuring concrete data (Valkonen 1976, 66).

The operational environment consists of the EU environment (year 1998) and the environment before membership (year 1993). The environment creates production, market, technological and accident risk for the production factors. These factors are operationalised by the significance of production risk in crop and animal production, by the outlet for products, by the development and adoption of new technology, and by accidents. The economic factors are affected by financial and market risk, and operationalised by availability and adequacy of funding, by maintaining liquidity, and by changes in product prices. In addition, the environment causes direct institutional, human and accident risk to the farmer. These factors are operationalised by changes in agricultural policy, by the adequacy of the farmer's own knowledge, skills and education, and by accidents.

Changes in objectives, values, attitudes towards risk, management style, and the significance of risk factors between 1993 and 1998 are considered as the impact of alternation in the operational environment and characteristics of the farmer.

Strategic decision-making is operationalised by decision-making regarding adjustment into the EU, and the examined factor, decision-making on adjustment into the EU, is measured by decisions made by farmers, changes in production and economic factors, risk management strategies exercised, as well as investments made. Some of these variables concern the frequency of behaviour or when the data is taken directly from an outside register. The rest require the farmers' assessment, thus the reliability of these variables is lower than that of other variables.

The variables of the operational model are from both the questionnaire of 1993 and 1998, and from the rural business register. The reliability and validity of the variables requiring farmers' assessment were improved by framing questions as clearly as possible, by making sufficiently discriminate measures, and by asking multiple questions that measure the same state (Fowler 1991, 95-96). The variables are combined by principal component analysis to attain more reliable measures, and thus to enhance validity.

The main hypothesis of the study is that a farmers' decision-making on adjustment into the EU depends on the characteristic of the farmer, on the production and economic factors of the farm, as well as on the operational environment. The second hypothesis, related to the second objective of the study, states that the farmers' objectives, values and attitudes towards risk, management style, and the significance of risk factors have altered between 1993 and 1998 with regard to the change in the operational environment. Values are expected to alter less, because they are very stable in nature.

The hypotheses are tested by measuring the independence (statistical significance) between the variables. In the statistical tests, the null hypothesis is that the variables are independent, while the alternative hypothesis is that the variables are dependent. Thus, in the tests the null hypothesis is tested and rejection is attempted.

5. Empirical analysis of the study

5.1 Population and data

The basic unit of the study is a farm. The rural business register, kept by the Information Centre of the Ministry of Agriculture and Forestry, is an administrative and statistical register of all farms in Finland (Maatilatilastollinen vuosikirja 1996, 47). The register contains detailed and comprehensive data on those farms receiving some support, and basic information on other farms. The data are obtained and entered mainly from support applications, and validated as well as controlled by the administration in many stages. Therefore, the quality of data in the register can be regarded as very good. Since support is an essential part of farmers' income, almost every active farm applies for support; the representativeness of the active farms receiving support is almost 100%. Therefore, an active farm is defined in this study as a farm receiving basic support[1] in a certain year, and consequently a passive farm is a farm receiving no support. The population of this study consists of active farms. Table 5.1 presents statistics on active farms in 1995-1999[2].

Table 5.1. Active farms in 1995-1999.

	1995	1996	1997	1998	1999	Average yearly change
Number of farms	95 570	91 283	88 375	85 181	81 583	-3.7%
Arable land (1000 ha)	2 121	2 116	2 133	2 178	2 187	+0.8%
Share of rented land (%)	17.3%	18.9%	20.1%	22.7%	24.2%	+10.0%
Average size of farm (ha)	22.2	23.2	24.1	25.6	26.8	+5.2%
Average amount of basic support (FIM)	61 000	63 000	66 000	75 000	76 000	+6.1%
Share of on-farm incomes of all incomes (%)[3]:						
1. Full-time farmer	61.6%	61.5%	60.4%	60.4%	n.a.	-0.7%
2. Additional income farmer	10.2%	10.2%	9.9%	9.9%	n.a.	-1.0%
3. Part-time farmer	28.2%	28.3%	29.7%	29.7%	n.a.	+1.7%

The table shows that the number of active farms has been declining by an average of 3.7% yearly, and the average size of farm has been increasing at a somewhat higher rate because the amount of arable land has increased slightly[4]. The share of

[1] Basic support comprises arable- and animal-based CAP-support, less-favoured area support, general agri-environmental support as well as arable- and animal-based national support. It does not include support for milk and slaughtering.

[2] The data is taken directly from the rural business register.

[3] The share of on-farm incomes of all incomes for full-time farms is more than 75%, for additional income farms 50-75%, and for part-time farms less than 50%. These data are based on information given by farmers, and was not available for the year 1999.

[4] The main reason for increased arable land is the releasing of arable land from production limitation agreements. The abolishment of the prohibitory law on clearing land in the EU has also increased arable land.

rented land of total arable land has been increasing by 10% yearly. Thus about 43% of the growth of an average farm size is from renting, 18% is from the increased amount of arable land and the rest, 39%, is from buying land. Correspondingly, the amount of basic support increased slightly during 1995-1999, while the average amount of basic support increased relatively more due to the decreasing number of farms. The share of full-time farmers decreased somewhat, whereas the share of part-time farmers increased during 1995-1998.

The average age of a farmer in 1998 was 47.7. The main production lines in 1998 were: grain (30.7%), dairy (30.2%), beef cattle (8.2%), pig (5.9%), and other crop production (5.2%). The juridical form of the farm in 1998 was divided into family-farms (87.4%), estates (6.4%), and agricultural concerns (5.6%).

Finland has been divided into seven basic support areas: A, B, C1, C2, C2P, C3 and C4[5]. Figure 5.1 illustrates the support areas and some of the structural aspects in year 1998. The main difference between farms located in different support areas is the type of production: milk and cattle production is more concentrated in the middle and northern part of Finland, whereas those in the south consist of bigger, grain production farms. The share of full-time farmers is greater in the C2, C2P and C3 areas than in other areas, which can be explained by the higher share of dairy production in those areas. Farmers are on average 2-3 years older in the south than in the north. The rate of decline has been quite similar in other support areas except in C2P and C4: the number of farms has remained stable in C4, whereas the decline of farms has been 5.2% yearly in the C2P area.

The empirical data of the study consist of three sets of data: survey data from 1993, rural business register data from 1995-1998 and survey data from 1998. The original data set was taken from the rural business register of 1992 using the systematic random sampling method. The sample was restricted to farms practising agriculture and having at least 10 hectares of arable land in order to direct the survey to farms where agricultural production had a reasonable volume in total incomes. In the 1992 rural business register, there were altogether 121349 farms practising agriculture of which 79607 had at least 10 hectares of arable land.

The sample could be treated as a simple random sample, because the rural business register was in a random order in relation to the variables used in the study (Sonkkila 1996, 70). The original size of the sample was 1207 farms and the questionnaire was directed to the same number of active farms with at least 10 hectares of arable land in 1992 (Sonkkila 1996, 69). The form was made on the basis of the theoretical and operational model, and the requirements of statistical

[5] Area C3 can be further divided into four sub-areas (C3P1, C3P2, C3P3 and C3P4), and C4 into sub-areas C4P4 and C4P5. Furthermore, national support is different on the continent compared to the archipelago of A- and B-areas.

methods were taken into account when planning the scales of the variables. The questionnaire is presented in Appendix 1.

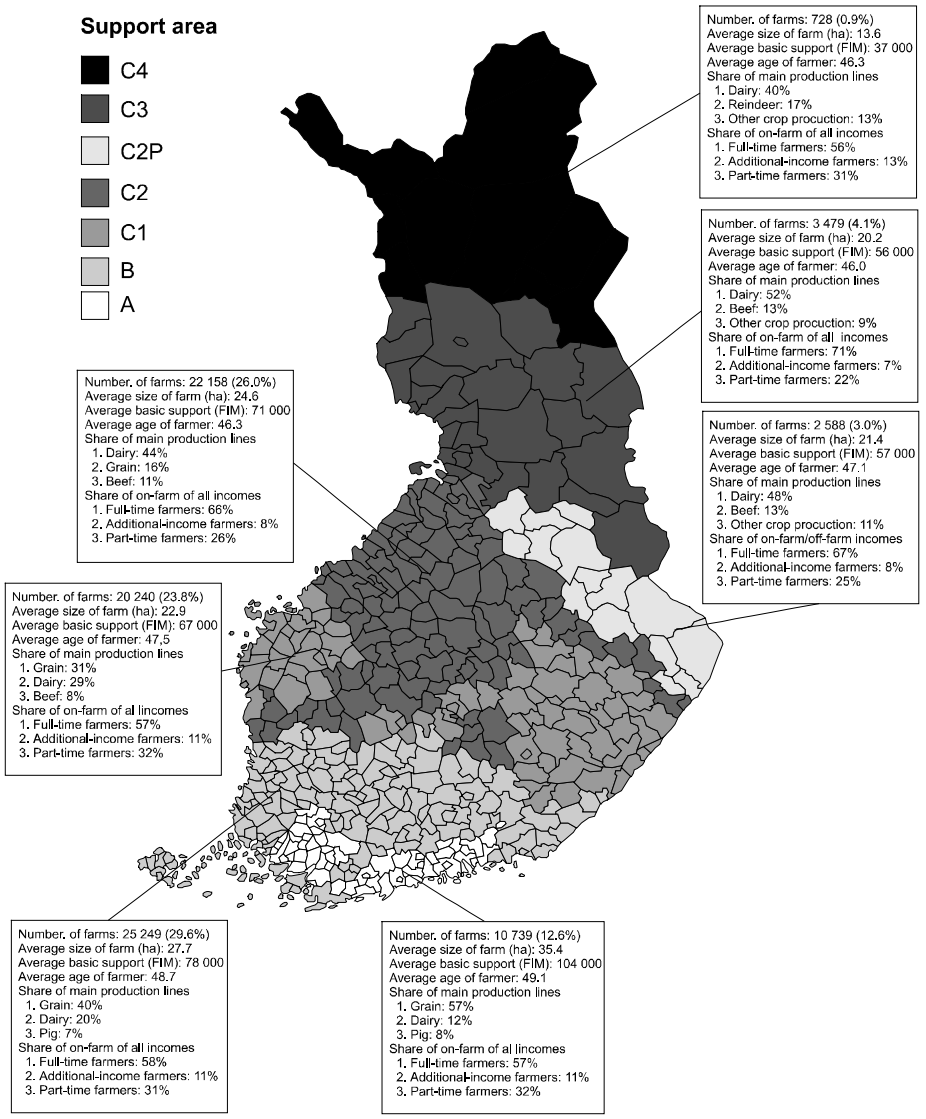

Figure 5.1 Characteristics of support areas in Finland in 1998.

Most of the questions were multiple-choice. Questions demanding respondents' opinions, attitudes or values were measured on a scale one to six, and these variables were assessed to meet the requirements of an interval scale. A few questions were specific information questions, which required respondents to provide a numerical answer. In addition, several open questions were asked.

The method of data collection for the 1993 survey was mailing. The questionnaire with an accompanying note and a return envelope were sent to the 1207 farms on 1 March 1993. Within three weeks 267 farms (22.1%) had returned the form. After this, a reminder was sent and during four weeks 180 farms (14.9%) responded but because the rate was regarded as a too low, an additional reminder was sent, and a further 100 farms (8.3%) returned the form. Thus the first set of data consisted of 547 farms participating in the survey on risk and decision-making, and the response rate in 1993 was 45.3%.

The effect of nonresponse to the survey depends on the percentage not responding and the extent to which these are biased (Fowler 1990, 48). The effect of nonresponse in 1993 was examined using two different methods. First, the data were compared to the population using those variables which were available such as arable area, age of farmer, juridical form of farm, production line and location of farm. Minor differences were noted but they were not significant (Sonkkila 1996, 78).

Secondly, the effect was studied in relation to the time the respondents returned the forms. This analysis is based on the idea that respondents interested in the topic return the form noticeably quicker than those who are less interested (Fowler 1990, 49). If significant differences are found in relation to certain variables, it is likely that nonrespondents differ from the data under these variables. As far as the 1993 data set was concerned, the data were divided into three groups on the basis of the time the forms were returned (those who responded immediately, those who responded after the first follow-up, and those who responded after the second follow-up). Statistical tests (F-test and χ^2 –test) were employed to test the groups against all variables in the operational model.

The tests revealed that the groups did not differ significantly under any other variable except education, which was higher for those who responded earlier (Sonkkila 1996, 79). For instance, Fowler (1990, 49) noted the relationship between level of education to nonresponse. Therefore, it can be said that the data corresponds to the population apart from the level of education, which is somewhat higher in the data than in the population.

In this study, the 1993 data are mainly utilised to compare the changes of farmers' objectives, values, attitudes toward risk, managerial issues and the significance of uncertainty factors. In addition, it was also used when examining farms quitting production.

The second set consists of data from the rural business register on those 547 farms in the 1993 survey. The variables taken from the rural business register are presented in Appendix 2.

The questionnaire of the 1998 survey was designed on the basis of the 1993 survey to follow-up possible changes that had taken place during the five years. However, some questions regarding adjustment into the EU were added and several questions were omitted, because some data could be taken directly from the rural business register and some was not relevant in this study.

The 1998 survey was directed to only 468 farms of the 547 farms, because it was known in advance from the rural business register that 79 farms had ceased farming during 1993-1997. Of those 79 farms, 47 had quit before 1995 and the remaining 32 farms had stopped between 1995 and 1997. The share of those quitting (2.9% yearly) was somewhat lower than in the population (3.7% yearly). The 1998 survey did not address non-active farms, because the focus was on active farms, and because sufficient data on non-active farms were available in the 1993 survey and the rural business register.

The method of data collection in the 1998 survey was mailing supplemented by telephone contact. A questionnaire (Appendix 3) with an accompanying note (Appendix 4) and a return envelope were sent to the 468 farmers on 16 February 1998. Within three weeks 269 farmers (57.5%) had returned the form; after this a reminder, a new form and a return envelope were sent to the nonrespondents. During four weeks an additional 94 farmers (20.0%) responded. Finally, the remaining were called and persuaded to return the form as a result of which 52 farms (11.1%) returned the form, so altogether 415 farms (88.7%) of the 468 farms took part in the survey making up the third set of data on farmers' decision-making on adjustment in to the EU. The data of this study are the combination of these three sets of data.

Any bias in the 1998 study can be considered insignificant because of the high response rate (88.7%). However, possible bias due to nonresponse was studied by comparing the three groups of respondents (those who responded immediately, those who responded after follow-up, and those who responded after telephone contact) against the variables of the operational model. Statistical tests (F-test and χ^2 –test) indicated that the groups do not differ significantly against any variable in the operational model so the reliability of the data due to nonresponse in 1998 can be consider to be good.

In the data, the average size of farm is 32.1 ha, the share of rented land of total land is 19.6% and the average amount of basic support is FIM 84 000. The average age of the farmer is 46.5. The main production lines are: dairy (39.2%), grain (28.5%), pig (7.9%), cattle (6.8%), other crop production (7.2%), and other (10.3%). The juridical form of the farm is divided into family-farms (92.1%), agricultural concerns (5.0%), and estates (2.8%). The share of on-farm incomes of all incomes is: full-time farmers 72.7%, additional income farmers 9.4%, and part-time farmers

17.9%. The distribution of the farms to support areas is: A (14.0%), B (28.4%), C1 (21.5%), C2 (27.6%), C2P (3.5%), and C3C4 (5.0%).

In comparison to the population the average size of farm in the data set is 30% higher, the share of family-farms is higher, the share of estates is lower, the share of full-time farms is higher and the share of part-time farms is lower. Furthermore, the share of dairy farms is higher and the share of farmers quitting farming is somewhat smaller. This is consistent with the difference of farm size between the data and population, because smaller farms are more likely to cease than bigger farms. However, the average age of farmer and the distribution of farms in different support areas is similar in both the data and the population. The difference between the data and the population is mainly due to the decision to limit the size of farms to a minimum of 10 hectares in the 1993 survey.

To summarise, the farms in the data are somewhat larger with more full-time farms than in the population due to the 1993 decision to limit the size of farms to a minimum of 10 hectares. In addition, the data are biased in relation to the level of education due to the rather low response rate in the 1993 survey; the educational level is somewhat higher in the data than in the population. Therefore the findings and the results of the study cannot be generalised in terms of all active farms but rather towards somewhat bigger active farms with farmers with a better education than the average.

5.2 Methods of the study

The statistical analysis of the data was carried out using SYSTAT 5.03 for Windows –software. Variables of objectives, values, uncertainty factors and risk management strategies were transformed by subtracting the given value from the number seven, when the greater value meant greater importance. Principal component analysis was applied to objective and value variables in order to combine information. Then, the resulting principal components were analysed against original variables and named. The data were described by distributions as well as average and dispersion figures using tables and diagrams. Finally, the operational model was tested by statistical tests.

The general objective of multivariate analysis is to compress the data in relation to variables with some kind of dependency. Multivariate analysis requires that variables have at least moderate dispersion and correlate against other variables. Principal component analysis aims at describing the variation of original variables by a smaller number of new variables, principal components (Chatfield and Collins 1980, 55). These components are uncorrelated, linear combinations of original variables received by executing an orthogonal transformation of original variables.

The usage of principal components in subsequent analyses reduces computational difficulties (Mardia et. al. 1979, 244). Principal components may be calculated from a correlation or covariance matrix, although the correlation matrix is commonly used to avoid the scaling problem (Ranta et. al. 1989, 464). In this study, all principal components were calculated from a correlation matrix, because the standard deviation was much greater for those variables with a small mean than those with a high mean, and this would therefore have had an harmful influence on the analysis.

No objective criteria exist to assess the applicable number of principal components, even though the rules of thumb determine that the last included principal component should explain the variation no less than the original variables (Chatfield and Collins 1980, 72). In the case of a correlation matrix, components with at least eigenvalue one are included. In practice, additional principal components may be accepted as well if meaningful interpretation can be found for them. The interpretation of principal components is based on the loading-matrix between components and original variables (Ranta et. al. 1989, 467). A deep interpretation can be obtained only if the original variables are multinormal (Ranta et. al. 1989, 464). However, the central limit theory proves that linear functions comply with normal distribution even when the original data are not multinormal (Mardia et. al. 1979, 60). Hence, adequate multinormality was assumed and therefore not tested in this study.

The rotation procedure is commonly carried out to ease the interpretation of the components. The VARIMAX-method, which is the most commonly used method of rotation, aims at obtaining a few large loadings and many small loadings by absolute value (Chatfield and Collins 1980, 73; Korhonen and Manninen 1993, 63). The VARIMAX-method was used in each principal component analysis in this study. The interpretation and nomination of principal components is rather subjective; the common method is to investigate the correlation between components and original variables, pick up large loadings by absolute value, and then assess the common characteristics of the variables.

The basic difference between principal component analysis and factor analysis is that while principal component analysis aims at finding linear combinations of variables explaining as much as possible the variation, factor analysis tries to find latent variables behind the original variables (Korhonen and Manninen 1993, 61). Furthermore, factor analysis is based on a well-defined statistical model, while principal component analysis is merely a transformation of the data (Mardia et. al. 1979, 275). As implied by this, component scores in principal component analysis can be accurately specified and used in subsequent analysis, whereas factor scores in factor analysis have to be estimated (Chatfield and Collins 1980, 89). Because this study aimed at compressing variables into fewer sets of new variables, and

using the scores in further analysis, principal component analysis was chosen as the method instead of factor analysis.

The dependent variable in this study, decision-making on adjustment into the EU, was nominal scale. Part of the independent variables were nominal, while the rest were interval or scale level variables. In this study, an analysis of two nominal scale variables was based on cross-tables, and the statistical independence was tested by Pearsons non-parametric χ^2-test

$$\chi^2 = \sum_{i=1}^{h} \sum_{j=1}^{k} (f_{ij} - e_{ij})^2 / e_{ij}$$

where h is a number of rows, k is a number of columns, e_{ij} is an expected frequency, and f_{ij} is an observed frequency. The null hypothesis of cross-table analysis states that row and column variables are independent (Korhonen and Manninen 1993, 17). The results of the cross-table analysis were mainly presented in diagrams.

In the case of nominal and interval or scale level variables, analysis of variance was used, and the statistical independence was tested by the F-test

$$F(k-1, N-k) = \frac{SS_B/(k-1)}{SS_w/(N-k)}$$

where F is the test of the null hypothesis that all groups have the same mean, N is the total sample size, k is the number of groups, SS_B is the sum of squares between groups, and SS_w is the sum of squares within groups (Bray and Maxwell 1985, 18-19). The results of the analysis were mainly presented as tables.

When two interval or scale level variables were analysed, the statistical independence was tested by the t-test

$$t = \frac{x_1 - x_2}{(s_1^2/n_1 + s_2^2/n_2)^{1/2}}$$

where x_1 and x_2 are the means, s_1^2 and s_2^2 are the variances, while n_1 and n_2 are the number of observations of the two variables (Bray and Maxwell 1985, 13-15). The null hypothesis of the t-test states that the variables have the same mean (Ranta et. al. 1989, 185). To test the hypothesis, a two-tailed test is used (see Ranta et. al. 1989, 110). The results of the analysis were mainly presented as tables. In all analyses, the result of the tests (statistical independence) were indicated as a

statistical significance (p)[6]. In the statistical tests, the population is expected to be infinite, and the data set is used to approximate the population.

Analysis of variance was used in the study instead of analysis of regression, because the dependent variable (adjustment into the EU) is a qualitative, nominal level variable. Analysis of variance does not presume a specific nature of the statistical relationship between variables, while the basic analysis of regression presumes linear relationship for the parameters. In this study, the relationship between dependent variable and independent variable is not necessarily linear, so the presumption of linear relationship was too restrictive to test the operational model. In addition, the regression coefficient was not relevant in this study. Furthermore, discriminant analysis allowed the investigation of the effect of several independent variables and their joint effect on the target variable in order to validate the results of the analysis.

The null hypothesis of one-way analysis of variance states that all groups have the same mean, and the alternative hypothesis is that at least one of the groups has a different mean than other groups (Bray and Maxwell 1985, 14). Tukey's pairwise test can be used to determine which of the groups differ significantly from the mean (Neter et. al. 1990, 589). Analysis of variance presumes variables to be normally distributed and to have homogenous variance (Bray and Maxwell 1985, 32-33). However, analysis of variance is rather stable to the deviations from the presumptions, and the stability increases when the sample size increases (Ranta et. al. 1989, 318). Therefore, analysis of variance was used instead of non-parametric methods.

Discriminant analysis aims at analysing the group differences in order to detect a discriminant rule, which allows the clearest possible identification of the population (Korhonen and Manninen 1993, 68). A discriminant rule divides the space R^p into several regions R_i (i=1,…,g); an observation belongs to the population P_k if it belongs to the region R_k (Mardia et. al. 1979, 300). The linear combinations of the p variables are formed to best separate the k groups by maximising the between-group variance of the linear combination relative to the within-group variance (Bray and Maxwell 1985, 42-43). The maximum number of discriminant functions cannot exceed the number of variables and the number of groups subtracted by one. Wilk's lambda[7] provides a test to quantify the discriminant power of the model. Discriminant analysis was used to investigate the common effect of variables to the adjustment decision and to find out possible dependency between the variables.

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[6] Statistical significance p is reported as a decimal number ($0.000 \leq p \leq 1.000$) and it indicates the probability that the null hypothesis is true. The smaller the p, the more obvious it is that the null hypothesis can be rejected. The limiting value generally used in statistical tests is that the null hypothesis can be rejected when $p \leq 0.050$.

[7] Wilk's lambda $L = |W|/|T|$, where $|W|$ is a determinant of the within-group matrix, and $|T|$ is a determinant of the sum of squares and products. The smaller the value of L, the better the groups can be discriminated.

5.3 Transformation and condensation of the data

The dependent variable in the operational model, farmers' decision-making on adjustment into the EU, is mainly based on the questions put to the farmers (see question B.1, variable b11 in Appendix 3). This variable was validated and specified by the question of the second most important means of adjustment (question B.1, variable b12 in Appendix 3), as well as by an open question concerning the reasons behind the adjustment decision (question B.2 in Appendix 3). Approximately 50% of the respondents answered the open question. Moreover, farmers' chosen and given adjustment decisions were cross-checked against the rural business register data. In other words, the decisions given by farmers were compared to the changes that had taken place in the production and economic factors of the farm. In the case of clear contradiction, the case was closely investigated in relation to various variables, and in some cases the dependent variable was modified. Altogether 26 cases were modified[8]. Because the dependent variable, farmers' decision-making on adjustment into the EU, has been checked in quite an exhaustive way, the validity of the variable can be regarded to be adequate.

A principal component analysis was carried out in order to condense the information associated with the 18 objective-variables (see question C, variables c1-c18 in Appendix 3). The analysis was carried out on 362 observations; nonrespodents and missing data were excluded, and farmers who had quit were not asked the questions. Five principal components were chosen for the forthcoming analysis, because the eigenvalue of the fifth component was 1.070, while the eigenvalue of the sixth component was 0.948, and the sixth principal component did not provide additional information. Appendix 5 illustrates the matrix of rotated loadings. Together the five principal components explain 57.6% of the variation of original objective variables.

The first principal component loads best to increasing size of farm, expanding production, acquiring new and bigger machinery and buildings, and ensuring continuation. The principal component is clearly associated with development and expansion of farms and production. The second principal component is associated with risk reduction, small loans in relation to assets, avoiding losses, and maintaining liquidity. The principal component is closely connected to risk reduction.

The third principal component loads to increasing profit, raising total incomes, improving return of capital, increasing amount of supports and expanding property. The component is associated with increase of returns. The fourth principal component is associated with increasing household spending and leisure time, and improving the quality of life. The component is linked to the improvement of

household life. The fifth principal component is related to taking care of the environment, improving the quality of products and maintaining liquidity. The component is associated with the production of quality products in an environmentally sustainable way.

On the basis of the preceding analysis, the principal components were named in the following way (code and number in parenthesis represent code of a new principal component variable and how much each principal component explain the variation of the original variables).

1. Develop farm and production (C2PCA1, 15%)
2. Decrease risk (C2PCA2, 10%)
3. Increase returns (C2PCA3, 15%)
4. Increase household spending and leisure (C2PCA4, 9%)
5. Produce environmentally sustainable quality products (C2PCA5, 9%)

A second principal component analysis was carried out in order to condense the information associated with the 17 value variables (see question F, variables f1-f17 in Appendix 3). The analysis was performed on 365 observations excluding nonrespodents, and farmers who had quit were not asked the questions. Four principal components were chosen for the forthcoming analysis, because the eigenvalue of the third component was 1.017, while the eigenvalue of the fourth component was 0.926, and the fourth principal component did provide additional information. Appendix 6 illustrates the matrix of rotated loadings. Together the four principal components explain 58.3% of the variation of original variables.

The first principal component loads best to the possibility of having reasonable incomes, making profit, job assurance and to respect gained from work. The principal component is associated with instrumental values derived from farm work. The second principal component is associated with the way of life, outdoor life and environmentally friendly production. The principal component is closely linked to the intrinsic value of farming life itself.

The third principal component loads best to belonging to a farm community, to the possibility of expanding production, self development and to respect gained from work. The component is associated with the social and expressive value of meaningful work. The fourth principal component is associated with work independence, versatility, doing work one chooses, self development, the potential to express oneself, entrepreneurship, and challenging work. The component is linked to expressive and intrinsic values of entrepreneurship in the countryside.

[8] The most important means of adjustment and the second most important means of adjustment were switched, when the open question and other variables clearly indicated that the answer should be the other way around.

On the basis of the preceding analysis, the principal components were named in the following way (code and number in parenthesis represent code of a new principal component variable and how much each principal component explains the variation of the original variables).

1. Earning (F2PCA1, 16%)
2. Farming lifestyle (F2PCA2, 11%)
3. Meaningful work (F2PCA3, 14%)
4. Entrepreneurship in the countryside (F2PCA4, 17%)

5.4 Description and test of the variables in the operational model

5.4.1 Decision-making on adjustment into the EU

Decision-making on adjustment into the EU (see question b11 in Appendix 3) was classified into seven groups (see Figure 5.2). The most common decision was to maintain current production (44%). The second largest group was farms which had expanded production (20%) and the third group was farms which had quit production (15%). 10 percent of farms had increased off-farm incomes, 5% had changed their main production line, 3% had reduced production, and 3% had introduced additional processing for agricultural products.

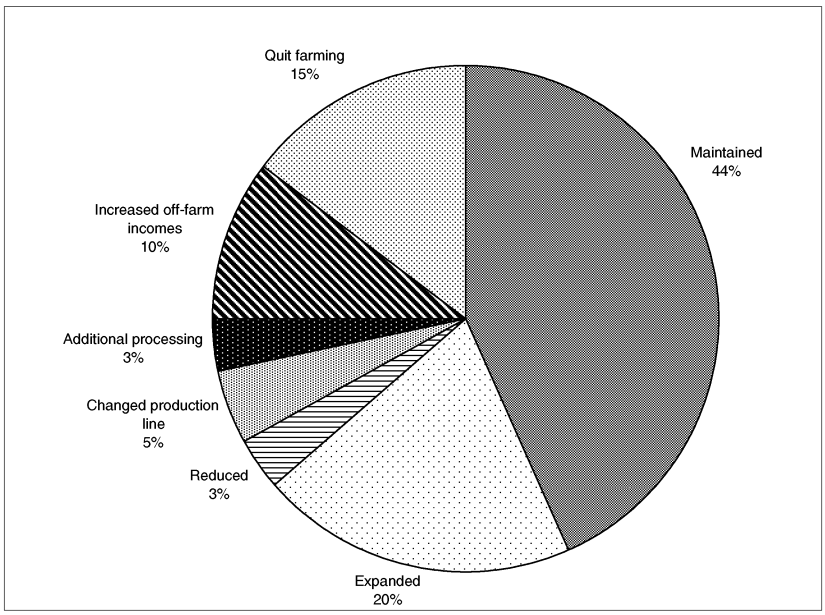

Figure 5.2 Farmers' decisions on adjustment into the EU.

Figure 5.3 illustrates the proposed decisions on adjustment into the EU between 1998 and 2002 (question B.5 in Appendix 3). The lowest bar in the diagram points out the distribution of the proposed decision on adjustment for all farms, while the others demonstrate the proposed decisions in relation to the current solutions on adjustment. Forthcoming decisions are distinctly dependent on current ones because restrictions related to farms and farmers as well as investments made limit future choices, and because many farmers have already made their decisions and plan to continue in that direction.

More than one third of farms are planning to maintain current production, 17% plan to expand production, 14% are uncertain, 8% aim at quitting farming, 8% plan to increase off-farm incomes, 7% to introduce additional processing for agricultural products, 4% to reduce production, 4% to hand over to the next generation, and 3% to change the production line. Farms maintaining current production at present are likely to continue with this even though almost 20% are uncertain about the decision. The share of farms planning to quit production is the third biggest in this group. Approximately 50% of expanding farms plan to continue expanding and nearly 30% of them are satisfied with the current level of production. Expanding farms are the most likely group to hand over to the next generation and correspondingly the share of solutions left open is the lowest among them. Reduced farms are the most uncertain about the future (almost 40%); one third plan to maintain the current level of production and one fourth intend to quit production.

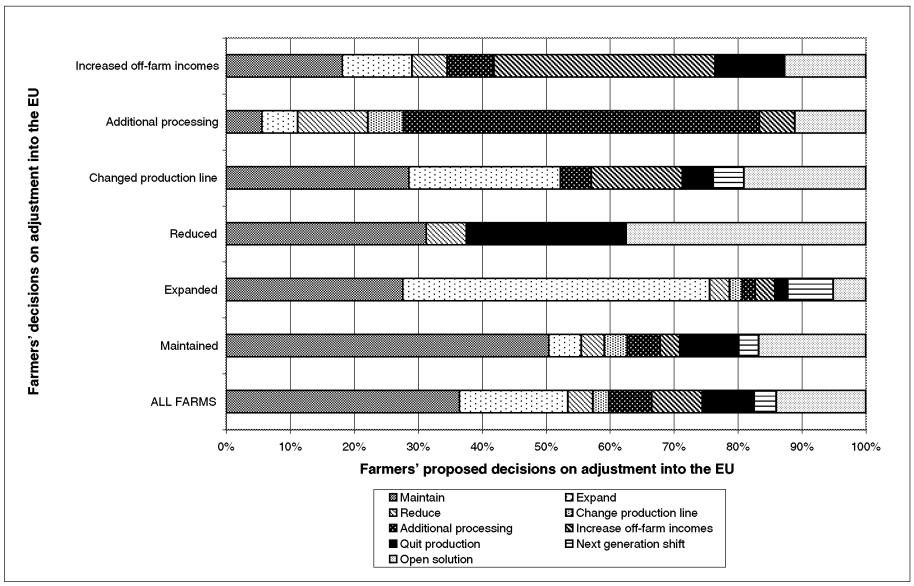

Figure 5.3 Farmers' proposed decisions on adjustment and their relation to the present solution.

Farms which have changed their main production line are mostly planning to maintain current production (30%) or expand (25%), although almost 20% are uncertain about their future direction. Most of the farms which introduced additional processing for agricultural products intend to continue as planned, and none of them plan to quit farming. Farms which increased off-farm incomes plan to keep this up (35%), maintain current production (20%), or are uncertain about the choice (13%). The share of farms planning to quit farming is the second biggest in this group (11%).

Figure 5.4 illustrates the second most important means of adjustment into the EU (question b12 in Appendix 3). The lowest bar in the diagram points out the distribution with regard to the above for all farms, while the others demonstrate this in relation to current solutions on adjustment. Altogether 40% of farms declared the second most important means of adjustment as follows; the most common means were to increase off-farm incomes (20%), to maintain current production (7%), and to change the production line (3%). The existence of the second means of adjustment was highly dependent on the primary decision on adjustment. This is obvious because certain means of adjustment may be combined with all other means, while some can only be combined with one or two of the means of adjusting.

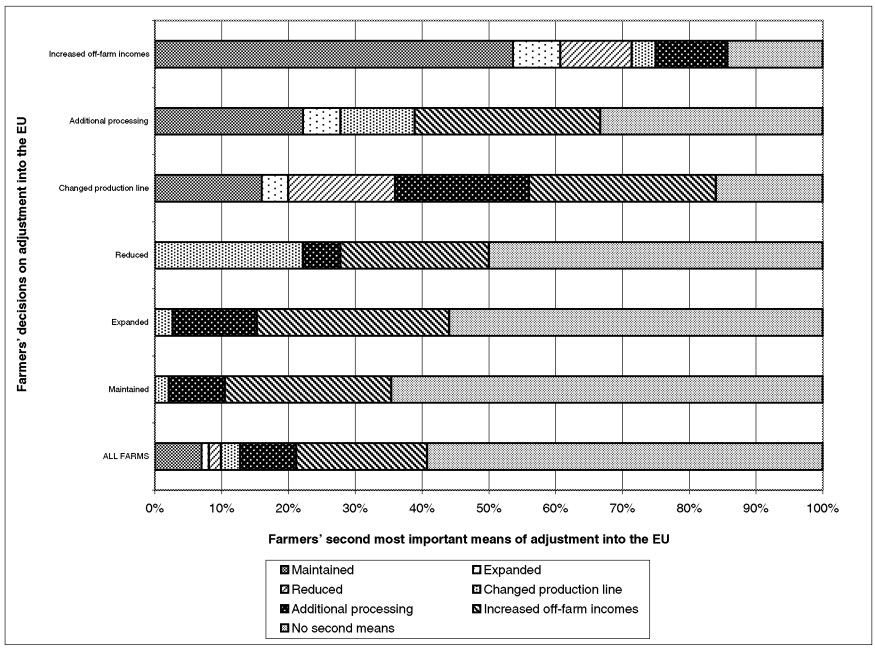

Figure 5.4 Farmers' second most important means of adjustment into the EU and their relation to the current adjustment solution.

Investments made during 1993-1997 are presented in Figure 5.5 (question B.4 in Appendix 3). The most common investments were other agricultural machinery

(40%), a tractor or combine harvester (39%), agricultural building (32%) followed by a dung or liquid manure cistern (17%), subsurface drainage (12%) and other (4%). 15% of farms stated that they had not invested in anything during the period. The figure also displays how investments are distributed and vary for different groups of decision-makers. Expanding farms are the greatest, whereas reduced farms are the smallest investors. All investments except other machinery and subsurface drainage are statistically dependent on the decision on adjustment. The direction and the magnitude of the dependency between decision on adjustment and investment made confirms the validity of the variable of adjustment decision.

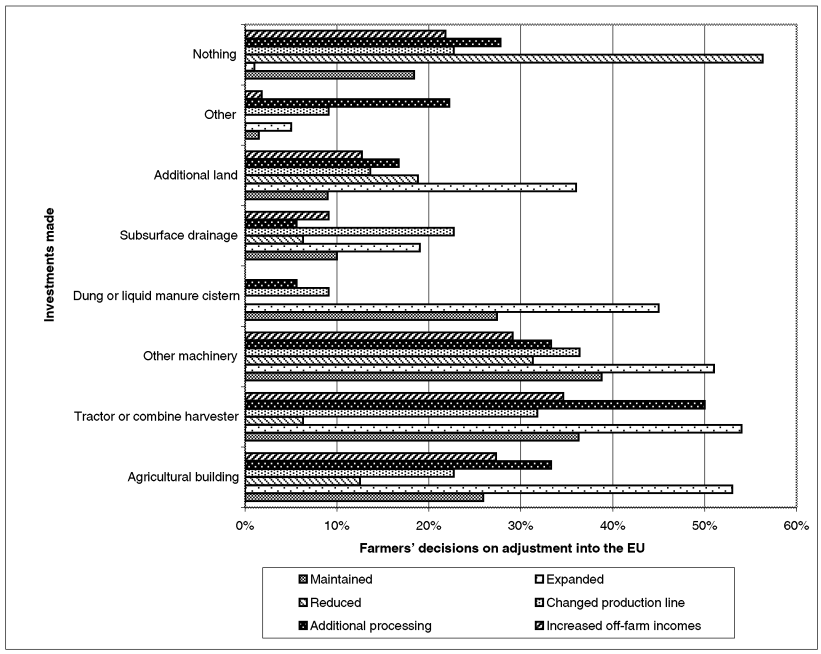

Figure 5.5 Investments made and their relation to the current adjustment solution.

The level of planned investments during 1998-2002 (question B.6 in Appendix 3) is lower than investments made during 1993-1997 (Figure 5.6). Only 70% of farmers planned to invest during 1998-2002, whereas 83% of them invested during 1993-1997. Even though the actual level of investment may be bigger than the intention, the high level of intention to refrain from investments reveals the uncertainty about the future that the farmers face. The share of farms planning to wholly refrain from investments is the highest for reduced farms (75%), for farms which introduced additional processing (44%), and for maintained farms (35%). On the other hand, over 90% of expanded farms plan to invest during the next five years.

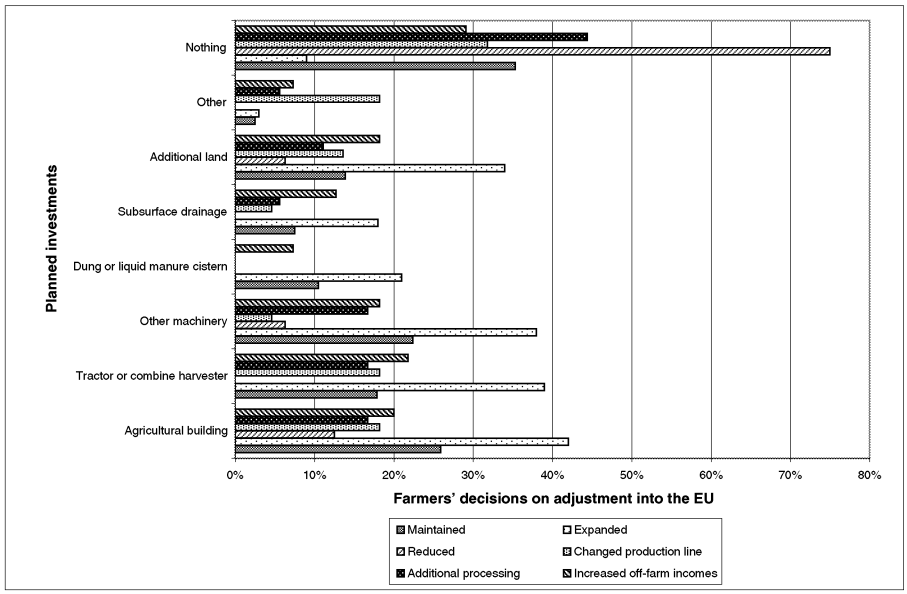

Figure 5.6 Planned investments and their relation to the current adjustment solution.

Figure 5.7 illustrates the proposed adjustment solution and its relation to the intention to invest during the period 1998-2002. The proposed adjustment solution is dependent on the intention to invest during 1998-2002 (p=0.000). The intention is lowest for farms planning to quit production, for farms whose solution is open, and for farms reducing production.

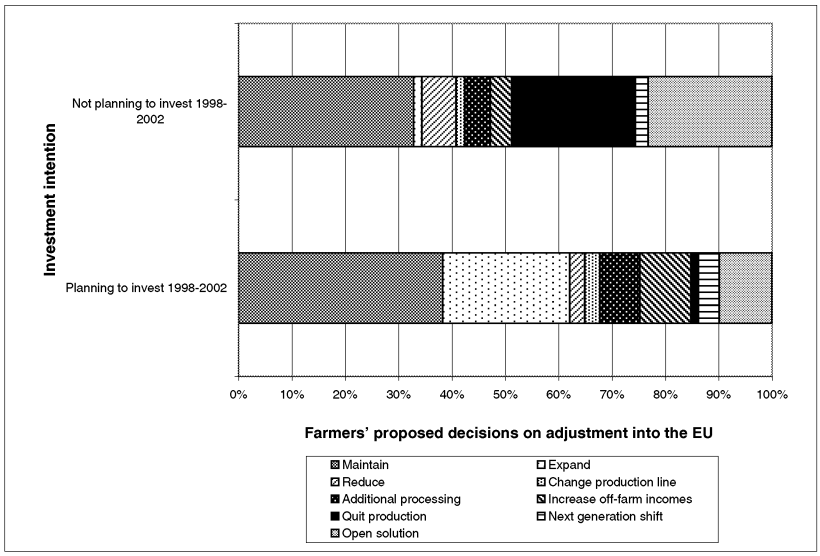

Figure 5.7 Investment intention and its relation to the proposed adjustment solution.

5.4.2 Production factors

The main production lines were dairy (39%), grain (28%), other production (10%), pig (8%), other crop production (7%), and beef cattle (7%). The adjustment solution is dependent on the production line (p=0.000), thus the null hypothesis that variables are independent is rejected (Figure 5.8). Expanded farms and farms which have maintained current production consisted of more animal, especially dairy and pork, farms than other groups; in other groups grain production was the most common production line. Crop farms more often turned to other means of adjustment into the EU than maintaining or expanding. Approximately 50% of the farms which increased off-farm income or introduced additional processing for agricultural products were grain farms. Farms which changed their production line most commonly shifted from dairy production to other production lines. The share of other production lines was quite high among those quitting and reducing farms. This production line of groups consisted of forestry farms, retirement farms, and farms exercising no production.

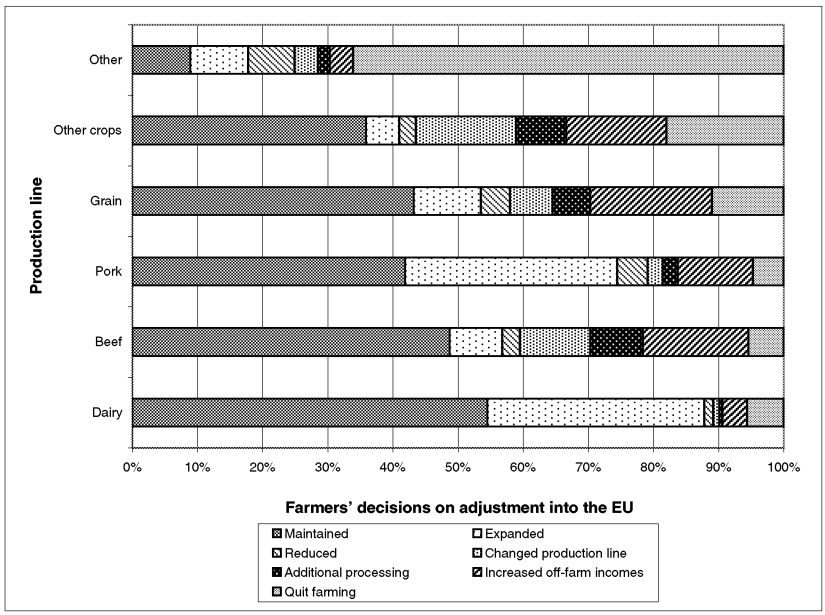

Figure 5.8 Production lines and their relation to the current adjustment solution[9].

The location of farms in different support areas in relation to the farmers' adjustment decisions is illustrated in Figure 5.9. Farms were distributed in support areas in the following way: Area A 14%, Area B 28%, Area C1 22%, Area C2 28%, Area C2P 4% and Area C3C4 5%. In the statistical analysis, it was found that the

[9] The production line for farms quitting is in accordance with the situation in 1993.

decision on adjustment into the EU was not statistically dependent on the location of the farm (p=0.580). In this case the null hypothesis that location and adjustment into the EU were independent could not be rejected. Thus, various adjustment decisions seemed to be distributed quite evenly in different parts of Finland, even though the level of support and the distribution of production varied regionally.

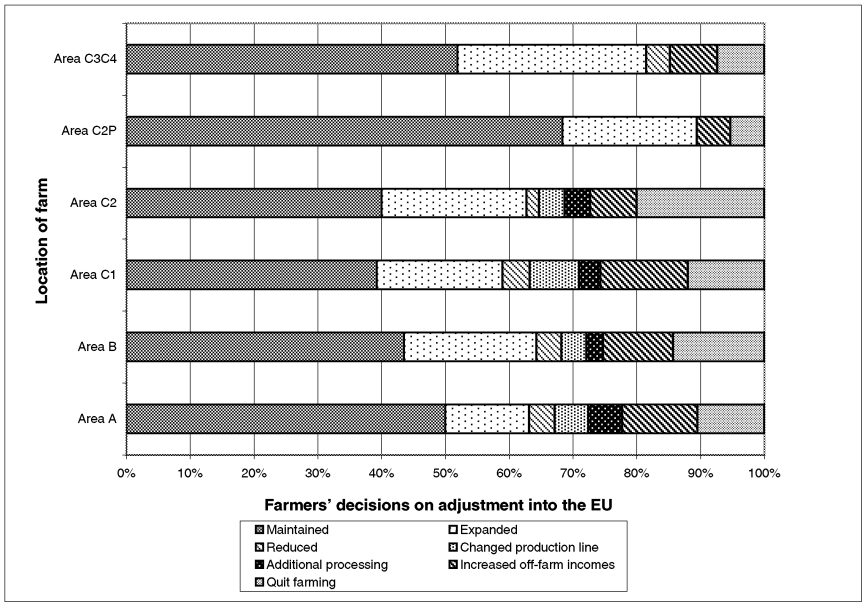

Figure 5.9 Location of farms and their relation to the current adjustment solution.

The average area of arable land has grown from 24.9 hectares to 32.1 hectares (+29%, 6.4% yearly), thus the growth rate has been higher than among all active farms. This is due to both the diminishing number of farms and the increased amount of arable land. The share of rented arable land of all arable land has been 20%, which is quite similar to the population.

It was found that farmers' decisions on adjustment into the EU were statistically dependent on the arable area and number of cattle, thus the null hypothesis is rejected. The average area has increased in every group; expanded farms are the largest (46 hectares), and they have increased the amount of arable land more than others (+43%). Farms which quit were smaller than other farms on average.

The average number of dairy cows increased from 13.8 to 14.9 (+8%) and the average number of beef cattle from 16.2 to 18.7 (+15%) during the five years. Expanded farms and farms introducing additional processing for agricultural products were on average the biggest in terms of the number of hectares or cattle.

These farms had also increased the number of dairy cows while others had decreased. Farms changing their main production line decreased the number of cattle most; thus they have shifted from cattle production to other production lines. Table 5.2 presents arable area and number of cattle and their relation to the adjustment decision. In addition, Appendix 7 presents the correlation between continuous variables.

Table 5.2 Production factors and their relation to the current adjustment solution.

Production factors of farm	n	Mean	Main-tained	Ex-panded	Re-duced	Chan-ged produc-tion line	Addi-tional proc-essing	In-creased off-farm income	Quit	Risk (p)
Arable area 1998 (ha)	463	32.1 (24.2)	29.3 (22.7)	45.3 (29.8)	20.0 (12.9)	26.3 (10.9)	35.1 (19.6)	23.0 (14.3)	-	0.000
Arable area 1993 (ha)	546	24.9 (19.7)	25.7 (22.2)	31.8 (19.3)	19.3 (9.9)	24.1 (8.7)	33.2 (26.6)	18.4 (8.4)	17.2 (16.3)	0.000
Dairy cows 1998	205	15.0 (8.0)	14.4 (7.1)	17.0 (9.1)	7.3 (3.2)	7.0 (8.5)	20.0 (0.0)	11.4 (6.1)	-	0.013
Dairy cows 1993	238	13.8 (6.7)	14.5 (7.1)	15.1 (6.8)	7.4 (3.1)	11.4 (3.0)	15.0 (7.1)	12.1 (4.3)	9.3 (4.2)	0.001
Beef cattle 1998	244	18.9 (14.8)	17.1 (14.4)	23.3 (16.2)	7.8 (4.3)	12.8 (6.0)	25.4 (15.4)	17.8 (9.4)	-	0.018
Beef cattle 1993	238	16.2 (14.6)	15.2 (14.5)	18.0 (15.5)	13.2 (9.1)	20.4 (18.0)	26.6 (18.4)	17.4 (13.6)	9.6 (6.0)	0.046

Standard deviation is presented in parenthesis.

5.4.3 Economic factors

Table 5.3 illustrates how the average amount of agricultural income has dropped from FIM 288,000 to FIM 258,000 (-11%), while the average amount of debt has fallen from FIM 302,000 to FIM 255,000 (-16%) (see questions A.11 and A.12 in Appendix 3 and questions B.4 and B.5 in Appendix 1).

Table 5.3 Economic factors and their relation to the current adjustment solution.

Economic factors of farm	n	Mean	Main-tained	Ex-panded	Reduced	Chan-ged produc-tion line	Addi-tional proc-essing	In-creased off-farm income	Quit	Risk (p)
Agric. Income 1998	338	258 390 (258 262)	221 811 (204 588)	435 331 (315 725)	145 485 (341 418)	179 462 (152 253)	312 327 (266 626)	130 338 (143 830)	- -	0.000
Agric. Income 1993	474	288 271 (291 114)	288 118 (280 601)	411 895 (368 927)	246 359 (396 038)	265 084 (172 546)	301 823 (259 911)	169 486 (169 641)	198 478 (203 296)	0.000
Debt 1998	383	254 916 (309 316)	158 168 (199 546)	428 255 (403 116)	117 517 (305 644)	174 261 (191 145)	408 056 (314 771)	303 905 (308 037)	- -	0.000
Debt 1993	492	302 422 (407 944)	232 567 (255 714)	464 777 (454 020)	257 167 (419 781)	249 380 (227 699)	466 364 (362 086)	313 874 (290 945)	266 939 (706 085)	0.000

Standard deviation is presented in parenthesis.

Farmers' decisions on adjustment into the EU were statistically dependent on the income and debt, thus the null hypothesis is rejected. Expanded farms and farms introducing additional processing for agricultural products have more income and debt than farms on average, whereas reduced farms, farms increasing off-farm incomes, and farms which have changed their production line have less income than average farms. The variation of income and debt was high for reduced farms. The percentual level of income has fallen most for reduced farms (-41%), and for those which changed their production line (-32%), while expanded farms (+6%) and farms introducing additional processing for agricultural products (+4%) have even been able to increase their agricultural income.

The level of debt has lowered in all groups. Reduced farms (-54%) and farms maintaining current production (-32%) have decreased their debt percentually most, whereas farms increasing off-farm incomes (-3%) and expanded farms (-8%) have lowered their debt less than farms on average. The debt/income –ratio in 1998 varies from 2.3 (farms which increased off-farm incomes) to 0.7 (farms maintaining current production). This was partly due to the fact that debt concerns the whole family and may then comprise other debts than agricultural ones. Even though income has decreased, farmers have been able to decrease the level of debt. The most obvious reason behind this is that debt has partly been reduced from other sources of income than agriculture. These sources include forestry, where forest incomes were quite high during the 1990s; and wage incomes as the share of agricultural income in a family-farm decreased during the same decade.

The share of full-time farms is 73%, additional income farms 9% and part-time farms 18% (see Figure 5.10). The adjustment decision was dependent on the share of on-farm incomes of all incomes (p=0.000), thus the null hypothesis was rejected.

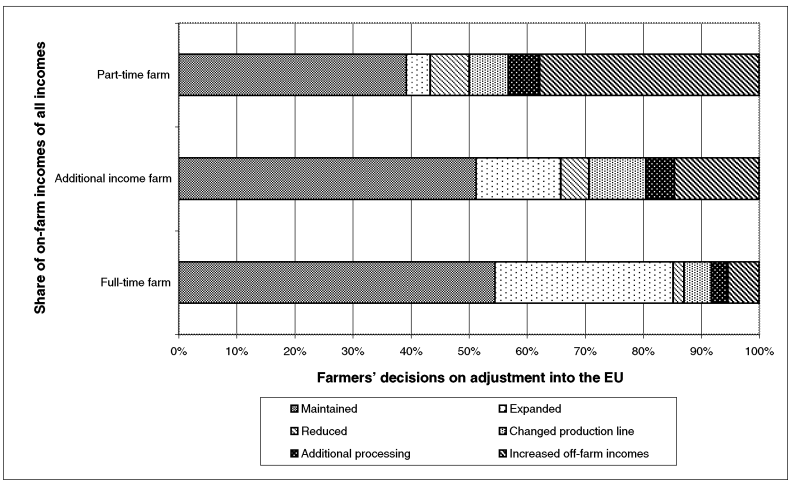

Figure 5.10 Share of on-farm incomes of all incomes and its relation to the current adjustment solution.

Full-time farms consisted of more expanded and maintained farms, while the share of farms which increased off-farm incomes and farms which reduced production was greater then on average among part-time farms. The major reason for this is that expanded and maintained farms consist of more cattle farms demanding more labour.

5.4.4 Farmer-related factors

5.4.4.1 Age, life cycle, successor and education

The average age of farmers has grown by 0.6 years during the period 1993-1998 and, at the same time, the time lapse for the change from the previous generation (question A.2 in Appendix 3 and question A.20 in Appendix 1) has grown by 1.1 years (Table 5.4). Farmers' decisions on adjustment into the EU were statistically dependent on the age and time lapse for the change from the previous generation, thus the null hypothesis was rejected. Farmers introducing additional processing for agricultural products, farmers who increased off-farm incomes and farmers expanding were younger than average, while farmers decreasing production and those maintaining current production were distinctly older. The same holds true for those handing over to the next generation. For farms changing their main production line there have been percentually more shifts from one generation to the next, because the time lapse has gone down. Changes in the main line of production frequently occur during the change to the next generation or just after.

Table 5.4 Farmers' age and time lapse from the previous generation to the next and their relation to the current adjustment solution.

Age and life cycle of farmer	n	Mean	Main-tained	Ex-panded	Reduced	Chan-ged produc-tion line	Addi-tional proc-essing	In-creased off-farm income	Quit	Risk (p)
Farmers' age in 1998	466	46.5 (10.5)	48.5 (10.5)	43.5 (9.3)	54.6 (11.4)	47.5 (12.2)	41.3 (9.7)	42.9 (9.1)	- -	0.000
Farmers' age in 1993	547	45.9 (12.0)	46.2 (11.2)	41.4 (9.8)	50.8 (9.7)	46.8 (13.1)	39.2 (10.5)	41.6 (10.7)	54.4 (13.2)	0.000
Years from last gener. shift in 98	389	18.5 (10.4)	20.4 (10.3)	15.9 (8.7)	25.7 (12.2)	16.0 (11.4)	17.1 (10.4)	15.5 (10.7)	- -	0.000
Years from last gener. shift in 93	509	17.4 (11.8)	17.5 (11.5)	14.6 (10.7	20.9 (11.5)	17.3 (10.2)	14.2 (10.5)	15.0 (12.6)	31.5 (9.2)	0.000

Standard deviation is presented in parenthesis.

The timing of the shift to the next generation on the farm is illustrated in Figure 5.11 (question A.5 in Appendix 3 and question A.21 in Appendix 1). 15% of farms plan to do this in five years, 32% of farms plan that the shift will take place

between 5 and 15 years, 21% intends to accomplish this in 15 to 25 years and 14% after 25 years, whereas 18% of farms plan to quit production. The share of farms planning to quit instead of handing over to the next generation had risen from 10% to 18% during the five years. The adjustment decision was dependent on the timing of the shift to the next generation (p=0.000), thus the null hypothesis was rejected.

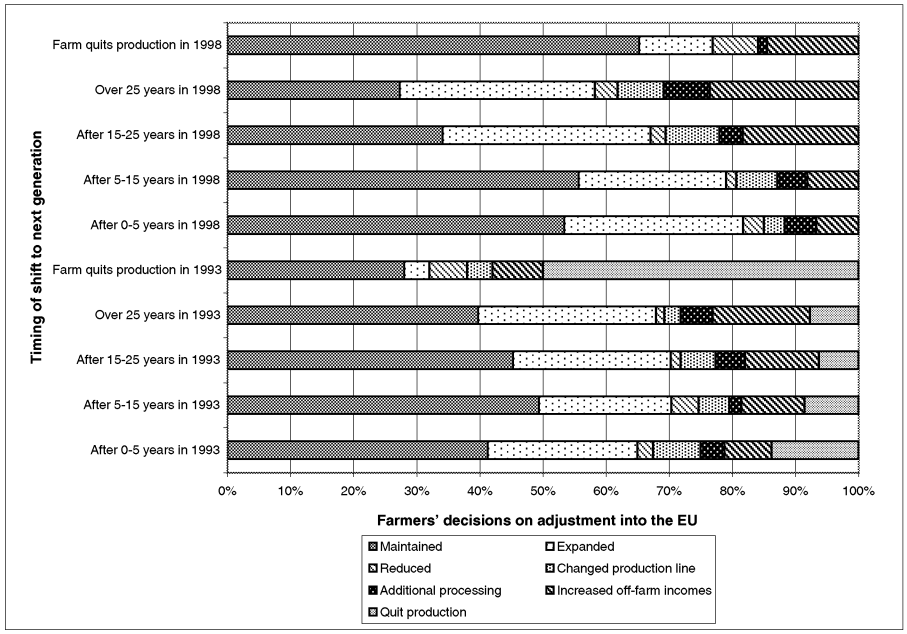

Figure 5.11 Timing of the shift to the next generation and its relation to the current adjustment solution.

The share of farms planning to quit was higher in 1998 in all groups except among farms changing their production line. The intention to quit farming was highest among reduced farms and those maintaining current production. The majority of maintained farms were either planning to hand over to the next generation fairly soon or alternatively to quit production. On the other hand, farms increasing off-farm incomes intended to make the shift quite late or then quit production. The plans to hand over for expanded farms seemed to be quite evenly distributed throughout the different time periods.

The assurance of a successor on the farm is presented in Figure 5.12 (question A.6 in Appendix 3 and question A.22 in Appendix 1). This was known by 25% of farms, 53% were unsure, and 23% had nobody. The uncertainty about the successor has increased somewhat during the five year period. The adjustment decision was dependent on the assurance of a successor (p=0.047), thus the null hypothesis was rejected. Farms changing their production line and expanded farms were the most certain about the successor, while reduced farms were the most uncertain.

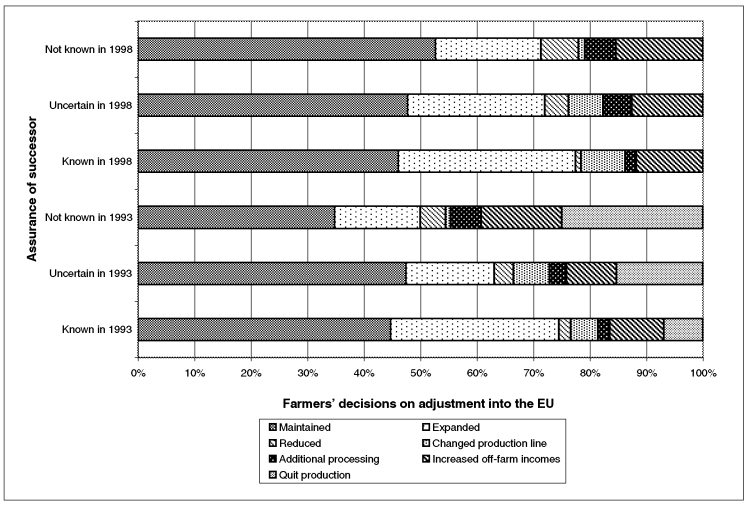

Figure 5.12 Assurance of a successor and its relation to the current adjustment solution.

The distribution of basic education for farmers (question A.3 in Appendix 3) was elementary school (66%), basic school (23%), and secondary school (11%) (Figure 5.13), and for their agricultural education (question A.4 in Appendix 3) no agricultural education (41%), agricultural courses (19%), agricultural school (33%), and agricultural college or university (6%) (Figure 5.14). The adjustment decision was both dependent on farmers' basic and agricultural education (p=0.000), thus the null hypothesis was rejected.

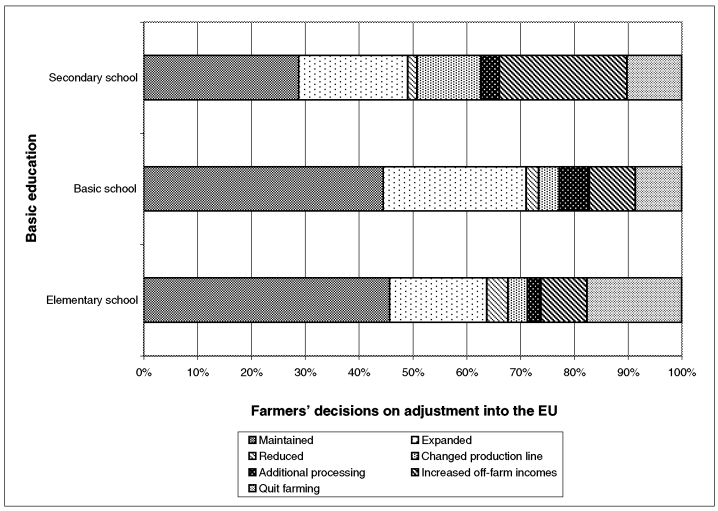

Figure 5.13 Farmers' basic education and its relation to the current adjustment solution.

The level of basic and agricultural education was higher among farmers expanding production, those who changed their production line, those who introduced additional processing for agricultural products, and among farmers who increased off-farm incomes, whereas it was lower among those quitting and reducing farming. Farmers who maintained current production had quite an average level of education.

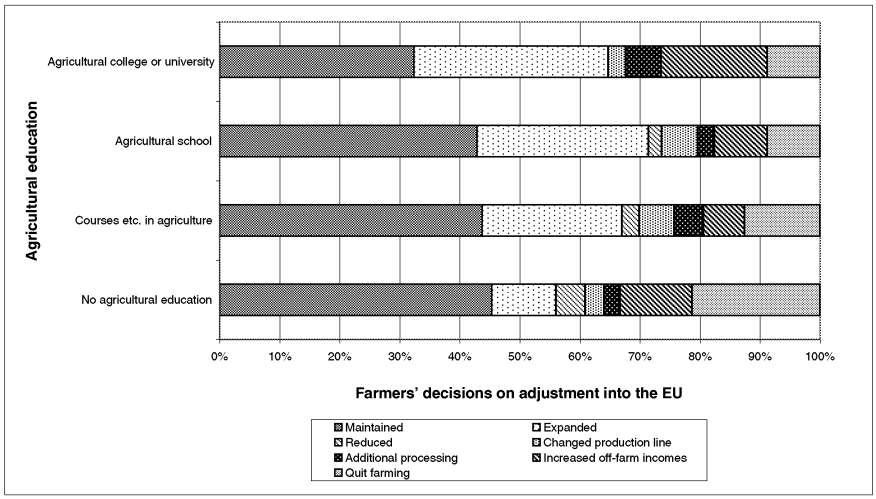

Figure 5.14 Farmers' agricultural education and its relation to the current adjustment solution.

5.4.4.2 Managerial issues and attitudes towards risk

One fourth of the farmers made a yearly budget (Figure 5.15), and the number doing this increased somewhat in the five years (see question A.10 in Appendix 3 and question B.3 in Appendix 1). Farmers expanding and those who changed their production line budgeted more than the average, while those reducing farming in particular seldom budgeted. Farmers reducing and changing their production line considerably decreased budgeting during the five years. The statistical test revealed that although the adjustment decision was almost statistically dependent on budgeting practice ($p=0.090$), the null hypothesis could not be rejected.

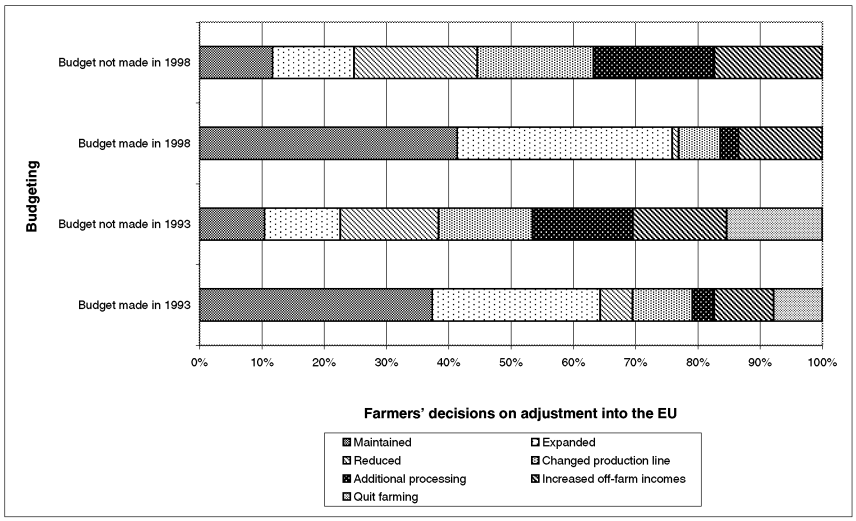

Figure 5.15 Budgeting and its relation to the current solution.

68% of the farmers spent no more than two hours a week on production and economic planning and control during wintertime (question A.9 in Appendix 3 and question B.10 in Appendix 1); 24% spent 2-5 hours, and the remaining 8% more than 5 hours a week (Figure 5.16).

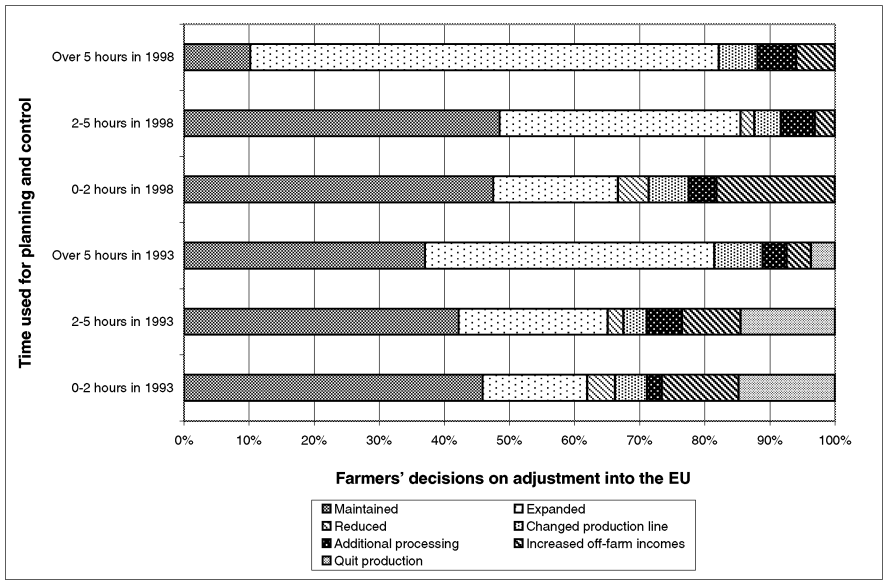

Figure 5.16 Time used for planning and control and its relation to the current adjustment solution.

The amount of time employed dropped somewhat during the five years and this applies to each group. The adjustment decision was dependent on the time used for planning and control (p=0.002), thus the null hypothesis was rejected. Expanded farms allocated a bit more time than the other groups and farms increasing off-farm incomes and reducing farming allocated less than on average.

Utilisation of a computer on the farm (question A.7 in Appendix 3 and question B.1 in Appendix 1) increased from 23% to 53% during the five years (Figure 5.17). Regular usage (at least once a week) also increased from 8% to 21%. The adjustment decision was dependent on utilisation of a computer (p=0.001), thus the null hypothesis was rejected. Farmers who changed their production line (73%), introduced additional processing for agricultural products (73%), or expanded (64%) utilised computers more than other groups, whereas those reducing (19%) and maintaining farms (45%) used them less in farm management than average farms.

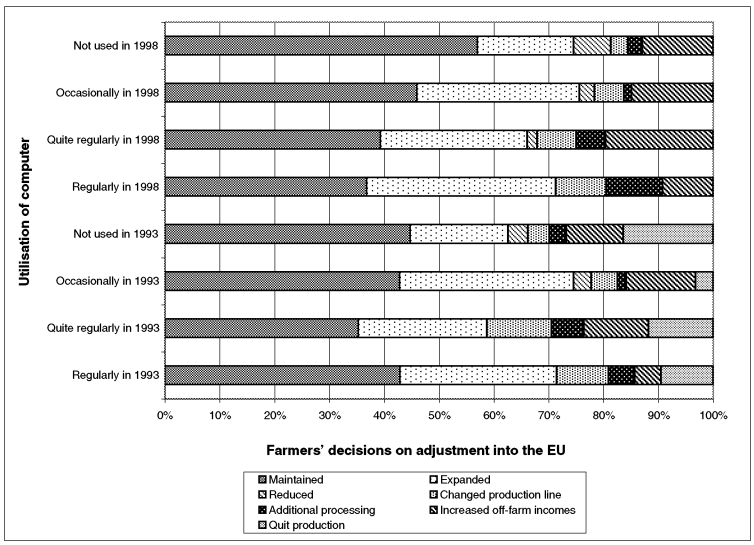

Figure 5.17 Utilisation of a computer and its relation to the current adjustment solution.

Figure 5.18 demonstrates that 65% of farms were doing the bookkeeping for taxation purposes by themselves and 30% were using a computer (question A.8 in Appendix 3 and question B.2 in Appendix 1). The number of farms doing the bookkeeping by themselves was stable during the five year period but the utilisation of a computer for bookkeeping rose greatly. The adjustment decision was dependent on the utilisation of a computer (p=0.001), thus the null hypothesis was rejected. Reduced farms employed the least outside service for bookkeeping; this may be due to the small amount of work involved.

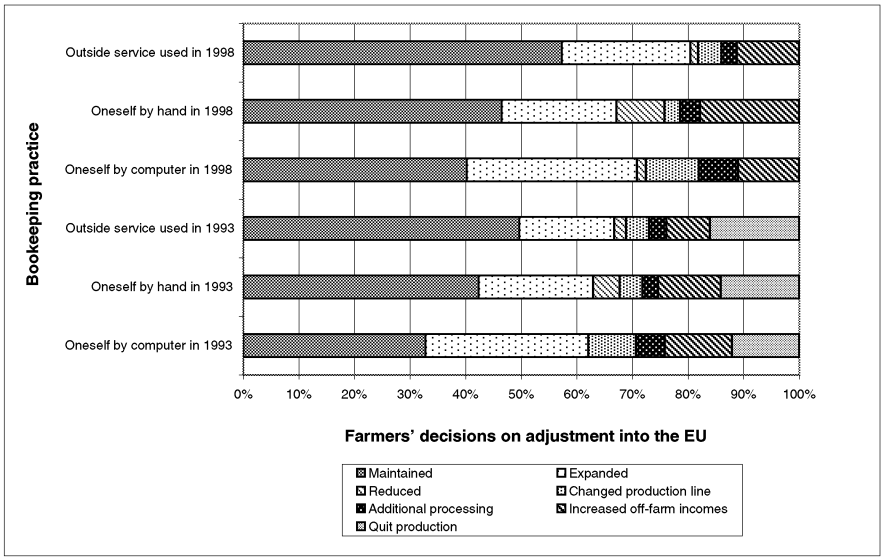

Figure 5.18 Bookkeeping practice and its relation to the current adjustment solution.

Farmers were asked whether their decision on adjustment into the EU was based on economic plans, calculations and comparison of alternatives or not (question B.3 in Appendix 3). 74% reported that the solution was based on plans, while the remaining 26% did not base the solution on plans (Figure 5.19). The statistical test revealed that the adjustment decision was statistically dependent on the question of planning (p=0.030), thus the null hypothesis was rejected. Expanded farms and farms introducing additional processing planned more than on average, whereas reduced farms planned less.

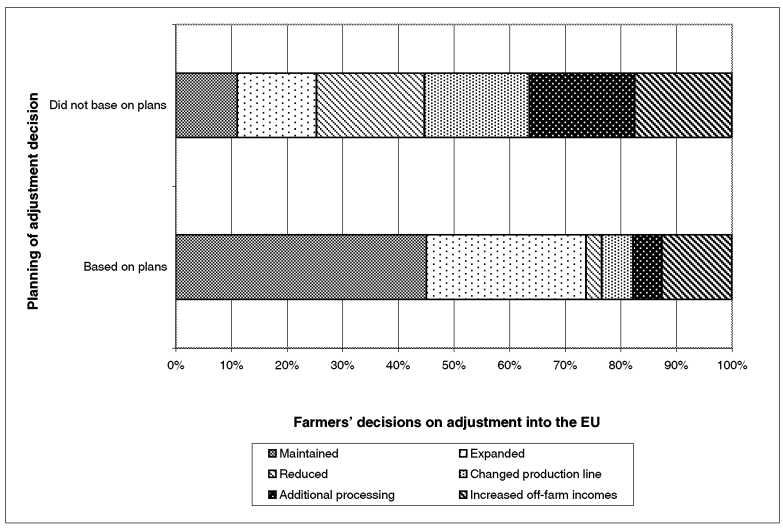

Figure 5.19 Planning of adjustment decision and its relation to the current adjustment solution.

Farmers were asked a simplified question related to their attitudes toward risk[10]. According to this risk measure, 79% of farmers were risk averse, 16% were risk neutral and 5% were risk takers (Table 5.5). On average, farmers were ready to pay FIM 24.3. Farmers' decisions on adjustment into the EU were statistically dependent on their attitudes toward risk, thus the null hypothesis was rejected. Farmers increasing off-farm incomes and changing their main production line were on average the least risk averse farmers. The level of aversion to risk had lowered in all other groups except expanded farms.

Table 5.5 Farmers' attitudes toward risk and its relation to the current adjustment solution.

Farmers' attitudes toward risk	n	Mean	Maintained	Expanded	Reduced	Changed production line	Additional processing	Increased off-farm income	Quit	Risk (p)
Attitude toward risk in 1998	356	24.3 (21.0)	22.3 (20.0)	20.7 (18.3)	19.4 (19.6)	32.3 (23.2)	24.9 (20.3)	35.1 (25.2)	- -	0.001
Attitude toward risk in 1993	429	22.1 (17.3)	19.1 (16.2)	23.2 (16.5)	13.6 (13.1)	30.5 (17.2)	19.7 (14.4)	26.4 (17.7)	26.3 (21.1)	0.002

Standard deviation is presented in parenthesis.

5.4.4.3 Objectives and values

Farmers were asked to estimate the importance of 18 different objectives (see questions c1-c18 in Appendix 3) on the farm and to the farm-family using a scale of one (very important) to six (not important). Most of the questions were similar to the questions presented in 1993 to the same group of farmers. The most important objectives were ensuring liquidity, avoiding losses, taking care of the environment, improving the quality of life, and reducing risk (Figure 5.20). The priorisation of objectives during the five years remained quite stable, although the environmental objective has been emphasised and the quality objective lowered.

[10] The question concerned a game situation, where respondents were asked how much they would be willing to pay for a lottery ticket, where a chance to gain FIM 100 was 50% and to gain FIM 0 was also 50% (P(0)=0.5 and P(100)=0.5) (see question G.2 in Appendix 3 and question I.4 in Appendix 1).

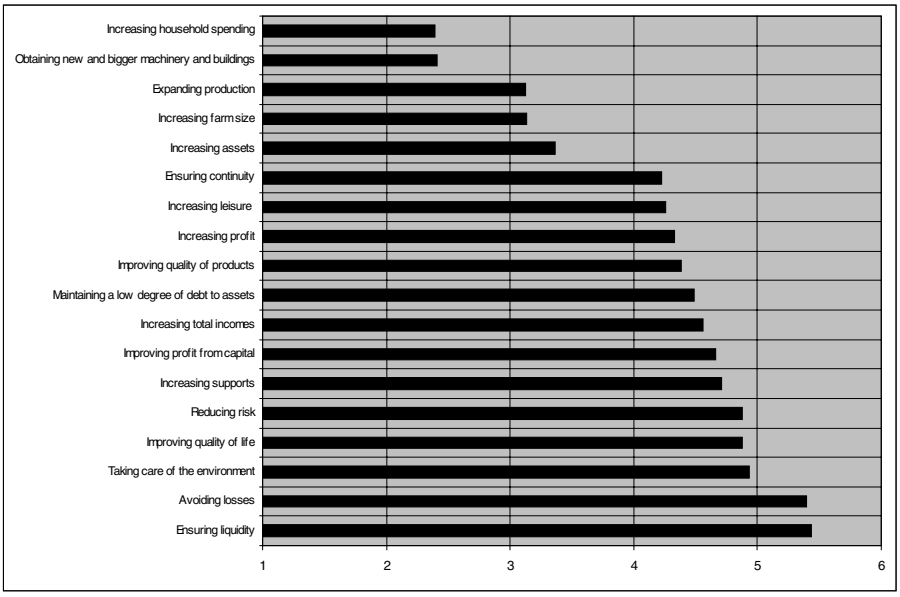

Figure 5.20 Farmers' assessment of the importance of objectives.

The priorisation of the objectives in relation to the adjustment decision were compared using five objective principal components (develop farm and production, decrease risk, increase returns, increase household spending and leisure, and produce environmentally sustainable quality products) (Table 5.6).

Table 5.6 Objectives and their relation to the current solution.

Farmers' objectives	Main-tained	Ex-panded	Reduced	Chan-ged produc-tion line	Addi-tional proc-essing	In-creased off-farm inocme	Risk (p)
Develop farm and production	-0.14	0.49	-1.07	-0.11	0.08	-0.21	0.000
	(0.97)	(0.93)	(0.60)	(0.93)	(0.99)	(0.98)	
Decrease risk	-0.03	0.10	-0.36	0.13	0.53	-0.24	0.065
	(0.96)	(0.85)	(1.70)	(0.91)	(0.61)	(1.24)	
Increase returns	-0.01	0.07	-0.67	0.08	0.07	-0.02	0.346
	(1.04)	(0.89)	(1.32)	(0.96)	(1.23)	(0.94)	
Increase household spending	0.01	-0.09	0.14	-0.05	0.12	0.11	0.863
and leisure	(0.99)	(1.02)	(0.76)	(0.94)	(0.91)	(1.12)	
Produce environmentally	0.00	0.09	0.08	-0.02	-0.02	-0.15	0.838
sustainable quality products	(0.94)	(0.94)	(1.33)	(1.24)	(1.52)	(0.94)	

Number of cases for each objective 363, mean 0.000 and s=1.000; higher value means greater importance. Standard deviation is presented in parenthesis.

The objective to develop the farm and production was the only statistically dependent variable on the adjustment decision, though the objective to decrease risk was almost dependent. Developing the farm and production was the most important for farmers expanding, and the least important for those reducing

farming. Decreasing risk was the most important for farmers introducing additional processing for agricultural products and the least important for those reducing farming and increasing off-farm incomes.

Farmers were asked to estimate the importance of 17 different values in farm management (see questions f1-f17 in Appendix 3) using a scale of one (very important) to six (not important). Most of the questions were similar to the questions presented in 1993 to the same group of farmers. The most important values were independence of work, versatility of work, the possibility to do work one likes, lifestyle, and the possibility to earn reasonable incomes (Figure 5.21). During the five years, the importance of various values stayed almost identical; the value of environmental issues in production rose slightly, while the value of entrepreneurship dropped.

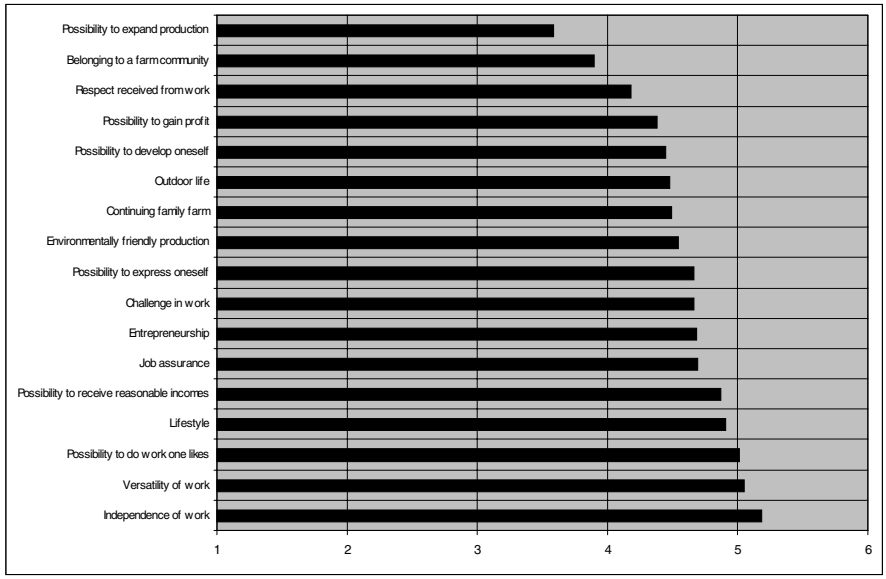

Figure 5.21 Farmers' assessment of the importance of values.

The importance of the values in relation to the adjustment decision were compared using four value principal components (earning, farming lifestyle, meaningful work and entrepreneurship in the countryside) (Table 5.7). Each of these components was statistically dependent on the adjustment decision. Earning was the most important to reducing and expanding farmers and the least important to those increasing off-farm incomes and those adding processing for agricultural products. Farming lifestyle was the most important value for farmers reducing and maintaining current production and the least important for farmers expanding, introducing additional processing for agricultural products and changing their production line.

Table 5.7 Values and their relation to the current solution.

Farmers' values	Main-tained	Ex-panded	Reduced	Chan-ged produc-tion line	Addi-tional proc-essing	In-creased off-farm inocme	Risk (p)
Earning	0.07	0.23	0.29	-0.11	-0.25	-0.51	0.000
	(0.91)	(0.87)	(1.25)	(0.89)	(1.45)	(1.12)	
Farming lifestyle	0.16	-0.32	0.47	-0.22	-0.22	0.06	0.003
	(0.89)	(1.04)	(1.47)	(1.00)	(0.94)	(1.05)	
Meaningful work	-0.01	0.20	-0.96	0.34	0.15	-0.24	0.001
	(0.95)	(0.94)	(1.52)	(1.00)	(0.85)	(1.04)	
Entrepreneurship in the countryside	0.01	0.11	-0.75	0.14	0.33	-0.27	0.039
	(0.92)	(0.92)	(1.61)	(0.58)	(0.93)	(1.28)	

Number of cases for each objective 366, mean 0.000 and s=1.000; higher value means greater importance. Standard deviation is presented in parenthesis.

Meaningful work was the most important to farmers who changed their production line, expanded farming and for farmers who added processing for agricultural products, while those reducing farming and increasing off-farm incomes regarded meaningful work as the least important. Entrepreneurship in the countryside was the most important for farmers introducing additional processing for agricultural products and the least important for those reducing farming and increasing off-farm incomes.

5.4.5 Operational environment

Farmers were asked to estimate the significance of nine different factors causing uncertainty on the farm (see questions d1-d9 in Appendix 3) using a scale of one (very significant) to six (not significant). The questions were similar to those presented in 1993 to the same group of farmers, although the amount of variables was much smaller. The most significant uncertainty factors were changes in agricultural policy, maintaining liquidity, variations in product prices, accidents, and outlets for products. The relative significance of various factors of uncertainty had somewhat altered; changes in agricultural policy were more highlighted, while sales of products and availability and adequacy of funding were regarded as less significant in 1998 than in 1993.

The significance of the uncertainty factors was compared in different groups (Table 5.8). Out of the nine uncertainty factors, five were statistically dependent on the adjustment decision.

Table 5.8 Uncertainty factors and their relation to the current solution.

Significance of uncertainty factors	Mean	Maintained	Expanded	Reduced	Changed production line	Additional processing	Increased off-farm income	Risk (p)
Changes in agricultural policy	5.38 (1.00)	5.36 (1.01)	5.59 (0.69)	5.82 (0.60)	5.29 (0.90)	5.63 (0.81)	4.91 (1.39)	0.001
Maintaining liquidity	5.33 (0.99)	5.39 (0.91)	5.49 (0.81)	5.00 (1.55)	5.19 (0.93)	5.50 (0.89)	4.94 (1.32)	0.020
Variations in product prices	5.10 (1.17)	5.16 (1.13)	5.18 (1.08)	5.00 (1.41)	5.24 (1.09)	5.44 (0.81)	4.66 (1.45)	0.074
Accidents	4.71 (1.25)	4.72 (1.25)	4.60 (1.22)	5.09 (1.30)	4.62 (1.24)	5.31 (0.87)	4.64 (1.36)	0.335
Outlets for products	4.67 (1.44)	4.76 (1.40)	4.63 (1.33)	4.73 (1.62)	4.86 (1.42)	5.06 (1.18)	4.23 (1.71)	0.197
Adequacy of ones own knowledge, skills and education	4.50 (1.36)	4.55 (1.26)	4.66 (1.35)	3.64 (1.80)	4.62 (1.07)	5.13 (1.41)	4.04 (1.53)	0.008
Production risk	4.43 (1.34)	4.49 (1.31)	4.43 (1.29)	5.00 (1.41)	4.29 (1.42)	4.81 (1.05)	4.02 (1.53)	0.116
Development and introduction of new technology	3.78 (1.43)	3.66 (1.38)	4.21 (1.31)	2.64 (1.96)	3.67 (1.59)	4.19 (1.52)	3.53 (1.41)	0.001
Availability and adequacy of funding	3.76 (1.77)	3.86 (1.79)	4.01 (1.66)	2.55 (2.02)	3.24 (1.70)	3.88 (1.93)	3.43 (1.72)	0.043

Number of cases 367, scale from 1 to 6 (1=not significant, 6=very significant).
Standard deviation is presented in parenthesis.

Availability and adequacy of funding were the least important factors to reduced farms and to farms which changed their production line. Adequacy of ones own knowledge, skills and education were the most important for farms introducing additional processing for agricultural products and the least important for reduced farms and those increasing off-farm incomes. Changes in agricultural policy were regarded as the most important by farms reducing production, while farms increasing off-farm incomes considered it the least important. Maintaining liquidity was the least important for reduced farms and for farms which increased off-farm incomes. Development and the introduction of new technology were the most important for expanded farms and for farms adding processing for agricultural products and the least important for reduced farms.

Farmers were asked to estimate the importance of five risk management strategies on the farm (see questions e1-e5 in Appendix 3) using a scale of one (very important) to six (not important). The questions were similar to the questions presented in 1993 to the same group of farmers, although the amount of variables was much smaller. The most important risk management strategies were maintaining adequate liquidity and solvency, and planning and controlling production and economy. The relative importance of risk management strategies remained rather stable during the five years.

The importance of risk management strategies was compared in the different groups (Table 5.9). Each of these five variables was statistically dependent on the adjustment decision. Planning and controlling production and economy was the least important for reduced farms. Obtaining off-farm incomes was the most important for farms involved in that and for farms introducing additional processing for agricultural products, and the least important for expanded farms. Contract production was the least important for reduced farms, and maintaining adequate liquidity and solvency the least important for farms which increased off-farm incomes. Diversification was the most important for farms which made additional processing for agricultural products and the least important for reduced farms.

Table 5.9 Farmers' assessment of the importance of risk management strategies.

Importance of risk management strategies	Mean	Maintained	Expanded	Reduced	Changed production line	Additional processing	Increased off-farm income	Quit	Risk (p)
Maintaining adequate liquidity and solvency	5.47 (0.86)	5.49 (0.79)	5.63 (0.59)	5.64 (0.67)	5.48 (0.68)	5.47 (1.30)	5.07 (1.26)	- -	0.010
Planning and controlling production and economy	5.14 (1.15)	5.21 (1.05)	5.37 (0.90)	3.64 (1.96)	5.10 (1.34)	5.33 (0.98)	4.76 (1.35)	- -	0.000
Obtaining off-farm incomes	4.26 (1.68)	4.14 (1.60)	3.47 (1.65)	4.27 (2.28)	4.39 (1.60)	5.20 (1.42)	5.74 (0.62)	- -	0.000
Contract production	4.11 (1.60)	4.18 (1.55)	4.28 (1.57)	2.64 (1.86)	3.86 (1.68)	4.07 (1.75)	3.98 (1.60)	- -	0.040
Diversification	3.51 (1.52)	3.60 (1.43)	3.29 (1.53)	2.73 (2.28)	3.91 (1.55)	4.40 (1.18)	3.33 (1.57	- -	0.024

Number of cases 368, scale from 1 to 6 (1=no important, 6=very important).
Standard deviation is presented in parenthesis.

Utilisation of risk management strategies is a part of farm management and thus a part of the farmers' decision-making on adjustment into the EU. The variables were statistically dependent, and the nature of dependency was consistent, hence farmers' evaluation of the importance of risk management strategies can be considered to confirm the validity of independent variables on decision-making on adjustment into the EU.

5.5 Characteristics of farms and farmers according to the decision on adjustment into the EU

The farms which maintained current production are close to the average for farms and farmers as far as the size of farm, incomes and debts, share of on-farm incomes of all incomes and characteristic of farmer are concerned. Farmers maintaining

production are on average two years older than farmers in general and the share of animal farms among them is bigger than the average. The farmers themselves do not distinctly prioritise various objectives or values. However, the intrinsic value of farming lifestyle seems to be the most important to them. The most common answers to their intention to adapt in the future are to continue to maintain current production with added reservations about future decisions.

On closer examination, it was found that this group could be differentiated by certain factors on the basis of the question of intention to invest during the next five years. 36% intended to refrain from making investments during the period 1998-2002. For these farms, the prioritisation of the objective of developing the farm and production was much lower than the rest of the maintained farms. In addition, the objective of producing environmentally sustainable quality products was lower than for those farms intending to refrain from making investments. These farms were somewhat smaller as far as the size, number of animals and income were concerned, and the age of the farmer was two years older than the rest of farmers maintaining production. However, the production line, support zone, share of on-farm incomes of all incomes, values and attitudes toward risk did not differ between these two groups. Farms intending to refrain from investing were also much more unsure about the future direction; 50% of the farms intended to quit production or indicated that the matter was open. The successor was known to only 10% of the above mentioned farms, while 32% of the rest of farms maintaining production had a successor. It was found that in the group of farms maintaining current production, the share of those quitting in 1998-2000 was considerably higher among those farms which stated that they would refrain from making investments than for those maintaining current production.

In conclusion, the majority of farms maintaining current production decided to continue this line because they were ready to make at the very least investments to keep their production in operation, and they were quite sure about the future. Even so, about one third were either planning to quit production or were unsure about future decisions. In the meantime they keep producing without investing. The matter of a successor is bound to be one of the decisive questions for these farmers.

In the open question (see question B.2 in Appendix 3) farmers put forward several reasons for maintaining current production. Some stated that age or health did not permit alternatives. Uncertainty about a successor was one of the reasons as well. Some emphasised the uncertain environment and a hard situation in farm economy leading to caution in decision-making as well as an unwillingness to make investments and to take an additional debt. In other cases, the small size of farm, small milk quotas, or low levels of labour or financial resources were the major reasons behind their decisions. In other words, farmers felt they did not have other options. To summarise, production and economy of the farm, the situation of the

farmer and farm-family as well as the assessment of the operational environment were mentioned in the farmers' answers. Therefore, the factors underpinning decisions are diverse and vary from one farmer to another.

The farms which expanded production are mostly animal farms and on average larger when measured by arable area and number of animals. Consequently, their on-farm incomes and level of debt are also higher than average, and they are mostly full-time farmers. They are better educated, younger, more risk averse, and utilise more modern management practice than average farmers. They prioritise the objective of developing the farm and production to other objectives. The instrumental value of earning as well as the social and expressive values of meaningful work are important to them, while the intrinsic value of farming lifestyle is significantly less important. The most common answers to their intentions to adapt in the future are to continue expanding and to maintain current production.

In the open question farmers explained the choices of expanding in the following way: a high level of debt forces one to expand, ensuring continuity and viability of the farm for transfer to the next generation, the possibility to buy additional land from nearby farms, a farm family has extra labour to increase production, more efficient use of machinery, securing income levels, the possibility to get investment support, no other possibilities except agriculture in the countryside, and a farmer young enough to develop and expand. Like farms maintaining production, all factors of the operational model were mentioned as reasons to expand production.

The farms which reduced production are on average smaller farms, whose most common production line is grain. Thus their on-farm incomes and debts are lower than average, and about half of them are part-time or additional income farms. Farmers reducing production are less educated, older and more risk averse than average farmers, and they do not utilise modern management practice so much. Increasing household spending and leisure are more prioritised objectives for them than development and increasing returns. Of the values, farming lifestyle and earning are important, whereas meaningful work and entrepreneurship in the countryside are less important. The most common answers to their intentions to adapt in the future are uncertainty, maintaining current production, and quitting. These farms are the most uncertain about the future and relatively the biggest group to quit farming.

In the answers to the open question, the EU, age and health of the farmer, unprofitable production and willingness to decrease work were mentioned as the reasons behind reducing production.

The farms which changed their production line are somewhat smaller in arable area and number of animals, and they are mostly crop farms. Their on-farm incomes and

debts are also lower than average. Farmers changing current production lines are average in age and better educated, utilise modern management practice more and are less risk averse than farmers on average. Objectives are not clearly prioritised, whereas meaningful work is regarded as the most important value and farming lifestyle as the least important. The most common answers to their intentions to adapt in the future are maintaining current production, expanding, and uncertainty.

To the open question, farmers explained their solutions in terms of profitability, the EU, a successor, health (allergy or asthma), willingness to leave animal production, and taking an interest in organic production.

The farms which introduced additional processing for agricultural products are larger than average farms but consist of more crop farms than farms expanding production. Thus their on-farm incomes and debts are higher than average, while the share of full-time farms is lower. These farmers are younger than other farmers, better educated than the average, and utilise modern management practice more. Risk reduction is the most important objective and entrepreneurship the most important value. Earning and farming lifestyle are the least important values. The most common answers to adaptation in the future are adding processing for agricultural products, uncertainty and reducing production.

To the open question the low income level of agricultural production, a higher degree of interest in additional processing than in basic agricultural production, and the possibility and resources to exercise additional processing were mentioned.

The farms which increased off-farm incomes are on average smaller farms, whose main production line is grain. Their on-farm incomes are lower but their debts are higher than average. The share of part-time farmers among the group is higher than in any other group. Farmers increasing off-farm incomes are younger than average, have a better basic education, utilise modern management practice in an average way, and they are less risk averse than other groups. Increasing household spending and leisure are the most important objectives for them, whereas decreasing risk and developing are the least preferred. These farmers regard diversification to off-farm work as an adequate method of risk reduction, which can also be noted by the fact that they assess obtaining off-farm incomes as the most important risk management strategy. The most important value is farming lifestyle, while earning, meaningful work and entrepreneurship in the countryside are not so important. The most common answers to their intentions to adapt in the future are further increasing off-farm incomes, maintaining current production, and uncertainty.

To the open question farmers explained their solutions in terms of low profitability and income levels, small farm size, adequacy of money, uncertainty in agriculture and the possibility to stabilise income by getting part of it outside agriculture. Some

farmers also emphasised the availability of off-farm income as well as further education of the farmer or spouse enabling them to work outside the farm.

The farms quitting production are on average smaller farms, whose main production lines are mostly dairy or grain. Their on-farm incomes are lower than average but their debts are average. Those quitting are clearly older, less educated and utilise less modern management practise than farmers on average. Farms quitting prioritise objectives associated with expanding and ensuring continuity the least. The most important value is intrinsic value, whereas instrumental and expressive values were the least important.

The timing of this study enabled the examination of farmers who had quit production after the survey; during the period 1998-2000. Altogether 47 of 468 farms quit production during the three years, so the share has been 3.3% yearly. The share in the year 2000 was higher than in 1998 or in 1999. This is probably due to Agenda 2000, under which farmers were to commit themselves to a new period of six years. Farmers quitting between 1998-2000 were quite similar to those who had quit production during 1993-1997.

Upon examination in terms of their intentions to future adaptation it was revealed that 38% intended to quit during the five years, 23% were unsure and 13% intended to maintain current production. The intentions seemed to correspond quite well to their real behaviour; farmers who stated their adjustment strategy were also committed to continuing production by following this strategy. The intention to quit farming was higher for those farms who had quit production in 1998 or in 1999 (60%), while the level of unsureness was higher for farmers who had quit production in 2000 (28%). The time period, therefore, affects how well the intention corresponds to real behaviour. Moreover, some of the farmers intending to continue maintaining current production had obviously not made a clear, conscious, strategic adjustment decision but rather decided to keep production as it was for a while and to observe changes in the operational environment.

The original adjustment decision on coming into the EU for farms quitting production differed from average farms: the share of reduced farms, farms increasing off-farm incomes and farms maintaining current production were higher, while the share of expanded farms was lower. Farmers quitting prioritised objectives related to development and risk reduction low, while farming as a lifestyle was a more important value for them than for farms continuing. The share of full-time farms (74%) as well as dairy farms (43%) and other crops farms (13%) among those quitting was higher than average. Therefore, small dairy and crop farms with aged farmers are the most likely to quit production. Table 5.10 summarises the characteristics of farms and farmers according to the decision on adjustment into the EU.

Table 5.10 Characteristics of farms and farmers according to the decision on adjustment into the EU.

Adjustment decision	Characteristics
Maintained production	• Quite average farms and farmers. • More animal farms than average. • Somewhat older than average farmers. • Intrinsic values are important. • Quite uncertain about the future.
Expanded production	• Mostly full-time animal farms. • Larger than average farms. • Better educated and younger than average farmers. • More risk averse than average farmers. • Utilising more modern management practice than average. • Instrumental, social and expressive values are important. • Development is an important objective. • Future is quite clear.
Reduced production	• Smaller, mainly grain farms. • More part-time or additional income farms than average farms. • Less educated and older than average farmers. • More risk averse than average farmers. • Utilising little modern management practice. • Intrinsic and instrumental values are important. • Uncertain about future.
Changed their production line	• Mostly crop farms, which somewhat smaller than average farms. • Better educated, average age farmers. • Utilising more modern management practice than average. • Less risk averse than average farmers. • Expressive values are important. • Future is quite clear.
Introduced additional processing for agricultural products	• Larger, mostly crop farms. • Better educated and younger than average farmers. • Utilising more modern management practice than average. • Instrumental values are important. • Future is quite clear.
Increased off-farm incomes	• Smaller, mostly part-time grain farms. • Younger than average farmers. • Less risk averse than average farmers. • Intrinsic values are important. • Quite certain about the future.
Quit production	• Smaller, mostly dairy and other crop farms • Less educated and older than average farmers. • Utilising less modern management practice than average. • Intrinsic values are important.

Discriminant analysis was used to test how the most significant variables in the operational model were able to discriminate the farms into groups according to the decision on adjustment into the EU. The basic criterion for choosing variables was the significance in one-way analysis of variance (F-test). In addition, the aim was to use continuous variables, and to have at least one production, economic and farmer-related variable in the analysis. Several trials were carried out using different combinations of variables in order to find an effective discriminant function using as low a number of variables as possible.

It was found that the ability of discriminant functions to discriminate was rather low even though the number of variables was increased considerably. Wilk's

lambda varied between 0.5 and 0.6, and correspondingly only 40-50% of the observations could be grouped into the right classes. The correctness of classifying varied from 25% to 63% depending on the group. The biggest group, farms maintaining current production, could not be classified properly, while those expanding and reducing could be more easily grouped into the right classes. When the group of farms maintaining current production was omitted from the analysis, about 60% of the observations could be correctly classified, and Wilk's lambda was 0.4. In addition, almost 70% of the observations were able to be discriminated into farms continuing and quitting.

Appendix 8 presents a discriminant analysis, where the discriminant variables are age of farmer, arable area, objective of developing the farm and production, agricultural incomes, attitudes toward risk, value of meaningful work and production line. In this analysis, Wilk's lambda was 0.51, and three discriminant functions were statistically significant. By examining the canonial loadings (correlation between dependent variables and canonial factors) it was revealed that the first discriminant function correlated positively to arable area, to the objective of developing the farm and production and to agricultural incomes; the second correlated negatively to age, positively to lower attitude toward risk and to crop farms instead of animal farms; and the third correlated positively to age, to arable area and to crop farms instead of animal farms.

Even though the analysis fails to predict accurately enough the adjustment decision on the basis of the significant variables in the operational model, by examining the misclassifications, the tests revealed which of the groups were close together. In particular, farms expanding and introducing additional processing for agricultural products seemed to be very similar on the basis of the analysis. Farms reducing and those maintaining current production were somewhat closer each to other than other groups as was the case for farms changing their production line and those increasing off-farm incomes.

Another indication of the discriminant analysis was that even though the factors of the operational model individually explained decisions on adjustment into the EU, the joint effect of these variables and thus their joint ability to explain decisions was not any clearer than any single factor alone[11]. Thus, the effect, relationship and magnitude of the factors in the operational model to decision-making vary in the data. In the light of this analysis, the operational model consisting of factors affecting farmers' adjustment decisions, and the relative importance and relationship of these factors greatly depend on the farmer and the farm.

[11] The correlation of the variables of the operational model was not high.

5.6 Changes in farmers' objectives, values, attitudes toward risk, managerial issues and the significance of uncertainty factors

The second objective of the study was to examine possible changes in farmers' objectives, values, attitudes toward risk, managerial issues, and the significance of risk factors in the EU environment (year 1998) compared to the environment before accession (1993). The changes were also compared with the different groups involved in decision-making on adjustment. The prioritisation of the most important objectives had remained quite stable; ensuring liquidity and reducing risk were the most significant objectives (Table 5.11).

Table 5.11 Comparison in changes in objectives.

Objective	Mean in 1998	Mean in 1993	Diffe-rence	Risk (p)
Increasing farm size	3.14	3.53	-0.62	0.000
	(1.71)	(1.84)	(1.87)	
Ensuring continuity	4.23	4.68	-0.57	0.000
	(1.76)	(1.67)	(1.88)	
Improving quality of life	4.88	4.71	+0.19	0.029
	(1.28)	(1.43)	(1.64)	
Increasing profit	4.33	4.68	-0.41	0.000
	(1.49)	(1.29)	(1.67)	
Improving return of capital	4.66	4.78	-0.17	0.042
	(1.26)	(1.30)	(1.58)	
Avoiding losses	5.39	5.58	-0.14	0.056
	(1.13)	(0.88)	(1.31)	
Increasing leisure	4.26	3.71	+0.47	0.000
	(1.53)	(1.61)	(1.80)	
Expanding production	3.12	3.63	-0.60	0.000
	(1.61)	(1.68)	(1.77)	
Improving quality of products	4.38	5.41	-1.10	0.000
	(1.56)	(1.04)	(1.68)	
Increasing assets	3.36	3.54	-0.23	0.022
	(1.59)	(1.60)	(1.82)	
Ensuring liquidity	5.43	5.61	-0.18	0.017
	(0.98)	(0.81)	(1.15)	
Taking care of the environment	4.93	5.14	-0.17	0.017
	(1.14)	(1.01)	(1.30)	
Increasing total incomes	4.56	4.14	+0.34	0.000
	(1.34)	(1.46)	(1.67)	
Maintaining a low degree of debt to assets	4.48	5.16	-0.64	0.000
	(1.62)	(1.12)	(1.83)	
Increasing household spending	2.39	2.34	+0.07	0.430
	(1.28)	(1.36)	(1.63)	
Obtaining new and bigger machinery and buildings	2.41	2.50	-0.15	0.149
	(1.43)	(1.35)	(1.66)	
Reducing risk	4.84	n.a.	-	-
	(1.19)			
Increasing supports	4.78	n.a.	-	-
	(1.43)			

Number of cases 363 in 1998 and 480 in 1993, scale from 1 to 6 (1=not important, 6=very important). N.a. means that the question was not asked in the 1993 survey. Means in 1998 and in 1993 are calculated with all cases. However, the difference between objectives in 1993 and in 1993 is calculated in pairs, thus the distinction between mean in 1998 and mean in 1993 differs from the column 'difference'. Standard deviation is presented in parenthesis. T-test is used here as a standard measure to compare values. To test the hypothesis that the 1998 and 1993 values have the same mean, the two-tailed test is used to calculate the p-values.

Farmers' assessment of the importance of objectives had altered during the five years. In addition, when the changes were compared with the different groups of adjustment decision-makers, the analysis indicated that some groups did differ in various ways. The comparison and test between objectives in 1993 and 1998 in relation to adjustment into the EU is presented in Appendix 9.

The importance of the objective of improving the quality of products had clearly dropped. This change applied equally to each group, although the decrease was somewhat smaller for farms introducing additional processing for agricultural products. The decrease of the quality objective is obviously due to the lowered impact of agricultural production and thus product price to the farm income and profit because of the introduction of direct income supports

Improving the quality of life and increasing leisure was rated higher in 1998 than in 1993. All groups put increasing leisure higher in 1998 than in 1993. All groups except farms reducing and farms changing production lines rated improving the quality of life higher in 1998 than in 1993. Farms expanding, in particular, prioritised improving the quality of life high, while those reducing and introducing additional processing for agricultural products placed increasing leisure higher than other groups. The change in these values may be due to a general adjustment of values in society.

Maintaining a low degree of debt to assets was regarded as less important in 1998 than in 1993. Only farms which changed their production line considered this objective to be more important in 1998 than in 1993. The drop was highest for reduced farms. This may be due to lowered interest rates and a lower amount of debt on the farm.

The importance of increasing farm size decreased somewhat during the five years. The importance remained the same for expanded farms but it had decreased for other groups. Farms introducing additional processing for agricultural products and those maintaining current production, in particular, prioritised increasing farm size much lower in 1998 compared with 1993. Similarly, the prioritisation of increasing profit had dropped during the five years. Farms introducing additional processing for agricultural products rated increasing profit higher in 1998 than in 1993, while other groups, especially reduced farms, considered increasing profit less important in 1998 than in 1993.

Ensuring continuity was also valued as less important in 1998 than in 1993. This concerned each group involved in decision-making on adjustment, though the decrease varied among the groups. Farms introducing additional processing for agricultural products valued ensuring continuity much lower in 1998 compared with 1993. The importance of expanding production had decreased during the five

years as well. This concerned all groups except farms which changed their production line.

Increasing total incomes was regarded as more important in 1998 than in 1993. This concerned all groups except reduced farms. Farms adding processing for agricultural products had altered the importance more than other groups. Increasing assets had decreased somewhat during the five years. As far as the groups involved in adjustment to the EU were concerned, increasing assets was lower in 1998 than in 1993 except among those farms reducing and changing their production line.

The importance of taking care of the environment had decreased slightly during the five years. This concerned all other groups except those introducing additional processing for agricultural products. The importance of ensuring liquidity decreased somewhat during the five years for all groups involved in adjustment to the EU. Improving return of capital was regarded as less important in 1998 than in 1993. This concerned all other groups except those increasing off-farm incomes.

Farms which had quit production during 1998-2000 differed in certain cases from other farms as far as changes of objectives were concerned. Ensuring continuity, increasing profit, avoiding losses and maintaining a low degree of debt to assets were rated lower in 1998 than in 1993 compared to the other groups.

Farmers assessed increasing profit as more important in 1993 than in 1998, while increasing total incomes was regarded as more important in 1998 than in 1993. However, in the principal component analysis, both of these objectives loaded to the third principal component, increase returns, thus farmers regarded increasing profit and increasing total incomes as similar. The reason behind this change is difficult to explain and therefore requires further study.

The prioritisation of the most important values was quite stable during 1993-1998. The changes in values were somewhat smaller compared with the changes in objectives. Values are more stable than objectives, and therefore they may explain long-term, strategic decisions more than objectives. The most important values were independence of work, versatility of work, the possibility to do work one likes, and lifestyle (Table 5.12). The comparison and test between values in relation to adjustment into the EU is presented in Appendix 10.

Table 5.12 Comparison of changes in values.

Value	Mean in 1998	Mean in 1993	Diffe-rence	Risk (p)
Lifestyle	4.91	5.09	-0.17	0.026
	(1.25)	(1.14)	(1.41)	
Possibility to gain profit	4.38	4.42	-0.04	0.646
	(1.35)	(1.39)	(1.54)	
Outdoor life	4.48	4.64	-0.15	0.056
	(1.33)	(1.27)	(1.45)	
Independence of work	5.18	5.42	-0.25	0.000
	(1.05)	(0.93)	(1.24)	
Respect derived from work	4.18	3.95	+0.20	0.031
	(1.49)	(1.57)	(1.70)	
Entrepreneurship	4.68	4.87	-0.24	0.002
	(1.24)	(1.24)	(1.45)	
Possibility to develop oneself	4.45	4.61	-0.21	0.008
	(1.20)	(1.35)	(1.47)	
Belonging to a farm community	3.89	3.85	+0.06	0.526
	(1.43)	(1.49)	(1.71)	
Environmentally friendly production	4.54	4.27	+0.32	0.000
	(1.19)	(1.35)	(1.43)	
Job assurance	4.70	4.75	-0.05	0.566
	(1.37)	(1.41)	(1.51)	
Challenge in work	4.66	4.71	-0.11	0.180
	(1.25)	(1.31)	(1.46)	
Continuing family farm	4.49	4.67	-0.29	0.000
	(1.55)	(1.44)	(1.49)	
Possibility to express oneself	4.66	4.73	-0.18	0.015
	(1.19)	(1.28)	(1.35)	
Possibility to expand production	3.58	3.85	-0.43	0.000
	(1.52)	(1.53)	(1.67)	
Possibility to earn reasonable incomes	4.87	4.64	+0.19	0.013
	(1.20)	(1.32)	(1.40)	
Possibility to do work one likes	5.01	5.09	-0.12	0.018
	(1.11)	(1.13)	(1.21)	
Versatility of work	5.05	5.17	-0.15	0.022
	(1.06)	(1.00)	(1.18)	

Number of cases 367 in 1998 and 469 in 1993, scale from 1 to 6 (1=not important, 6=very important). Means in 1998 and in 1993 are calculated with all cases. However, the difference between values in 1993 and in 1993 is calculated in pairs, thus the distinction between mean in 1998 and mean in 1993 differs from the column 'difference'. Standard deviation is presented in parenthesis. T-test is used here as a standard measure to compare values. To test the hypothesis that the 1998 and 1993 values have the same mean, the two-tailed test is used to calculate the p-values.

The value of environmental issues, the possibility to earn a reasonable income, respect derived from work and belonging to a farm community have increased slightly during the five years, while the assessment of the other values was regarded as less important in 1998 than in 1993. The change in the environment value may be because of increased awareness of environmental issues as well as obligations in agri-environmental support. Maintained farms, farms which introduced additional processing for agricultural products and those increasing off-farm incomes valued environmental issues higher in 1998 than in 1993.

Farms maintaining and expanding production rated the possibility to earn reasonable incomes higher in 1998 than in 1993, while those reducing and increasing off-farm incomes considered this value to be less important in 1998 than in 1993.

Farms which changed production lines valued respect derived from work higher than other groups, while reduced farms clearly rated it lower. Farms maintaining production and those increasing off-farm incomes assessed the social value of belonging to a farm community as more important in 1998 than in 1993, while other groups rated this value as less important in 1998.

Farms which introduced additional processing for agricultural products assessed challenge in work, versatility of work, entrepreneurship, independence and the possibility to express oneself higher in 1998 than in 1993, whereas other groups rated these values lower. Reduced farms especially assessed these values much lower in 1998. Thus, values connected to entrepreneurship had lowered in basic agricultural production, while they had risen in other types of enterprise.

The valuation of expanding in 1998 compared to 1993 was higher for farms which changed their production line and lower for other groups. Consequently, the change of production line was based on improving profitability and expanding the production. The value of the possibility to gain profit was assessed lower in 1998 than in 1993 by other groups except farms expanding and those changing their production line. The value of continuing the family farm was lower in 1998 than in 1993 among all groups. Reduced farms valued the possibility to do work one likes as more important in 1998 than in 1993, while other groups rated it lower.

As far as the significance of uncertainty factors was concerned, the changes in agricultural policy were regarded as more significant than earlier, while the uncertainty of sales of products was regarded as less important nowadays than earlier on. Highlighting the uncertainty of agricultural policy was obviously due to the high dependence of farms on direct supports and therefore on political decisions. On the other hand, sales of products may be regarded among farmers as better guaranteed in the EU than earlier on, and moreover, the impact of product sales on returns is smaller for the lowered producer prices in the EU. Farmers seem to take the changes in the operational environment into consideration while assessing the uncertainty factors.

The share of risk averse farmers declined somewhat during the five years. In the question regarding risk, the average amount of willingness to pay had increased FIM 2.2 (10%) during the five years. In addition, the change in attitudes toward risk had altered in a dissimilar way among the various groups. Risk aversion had increased 10% among farms expanding, while in the other groups risk aversion was lower. Perceptually risk aversion had lowered most among reduced farms (43%), among farms increasing off-farm incomes (33%) and among farms introducing additional processing for agricultural products (26%).

Some managerial issues had altered greatly between 1993-1998, whereas some had remained quite stable. Utilisation of a computer in farm management had increased significantly during the five years. This is mainly due to the development of information technology in society. However, the use of time for planning and control of production and economy stayed quite the same in 1998 compared to 1993. Farms which increased off-farm incomes, in particular, had reduced this time. Furthermore, the share of farms making a budget had risen only slightly during the five years. Farms which expanded, which maintained current production and those increasing off-farm incomes had increased budget making, while farms reducing production did less budget work in 1998 than in 1993.

6. Examination of the results and conclusions

The farmers' adjustment into the EU according to this study was divided into farmers who maintained production (44%), farmers who expanded production (20%), farmers who quit production (15%), farmers who increased off-farm incomes (10%), farmers who changed their production line (5%), farmers who reduced production (3%), and farmers who introduced additional processing for agricultural products (3%). If the farms which quit are omitted, the share of farmers who maintained their current production is over 50%. However, the group was not homogenous, because some of them had made a conscious decision to maintain current production while others in the group were clearly quite unsure about the future. This was linked to the question of a successor and could be observed by the intention to refrain from investments. Almost 20% of the farmers maintaining current production were unsure about the adjustment and 10% of them planned to quit within the five years.

The reasons behind the solutions were severe, and about 75% of farmers declared that the decision was based on plans, calculations and assessments of various alternatives. Öhlmer et. al. (1993, 53) noted that one reason why farmers do not make detailed plans is uncertainty in the operational environment. According to Carson (1988, 93), long term decision-making and farm enterprise selection appear to be especially problematic for farmers.

The proposed adjustment strategy, being dependent on chosen strategy, was distributed to farmers maintaining production (37%), farmers expanding production (17%), undecided farmers (14%), farmers planning to quit production (8%), farmers increasing off-farm incomes (8%), farmers introducing additional processing for agricultural products (7%), farmers reducing production (4%), farmers planning to hand over to the next generation (3%), and farmers changing production line (3%). Kuhmonen (1995, 4) surveyed the five-year plans of Finnish farms having at least five hectares of arable land in 1995. In his study the share of farms planning to quit during the succeeding five years was higher (21%), while the level of farms planning to maintain current production (37%) was similar to this study. In addition, the share of farms planning to introduce additional processing for agricultural products was higher (11%), whereas the share of farms planning to expand was lower (8%) than in this study. Ylätalo et. al. (1998b, 85) explained the intention of dairy farmers in the municipality of Vieremä to continue production for at least five years. In 1996, six percent of farmers intended to quit production.

In the follow-up study in 1996 Kuhmonen (1996, 61-62) found that the intention to quit had lowered to 17%, the number of uncertain farms had increased and the level

of farms planning to introduce additional processing for agricultural products had decreased. In addition, during the three year period, 28% of farmers had altered their plans (Kuhmonen 1996, 62). Also Ylätalo et. al. (1998b, 83-84) noticed that quite a large number of farmers altered their plans during a one-year period. Because the intention does not always correspond to real behaviour, the reliability of intention variables is lower then those variables measuring already materialised actions (Ajzen 1985).

Among bookkeeping farms the share of farms planning to quit during the five years was a bit lower (6%) but the share of farms planning to expand production was clearly higher (39%) (Jokela and Ala-Orvola 1999). The greater share of expanding farms is mainly due to the representativeness[1] of bookkeeping farms in the population.

The level of planned investments was lower than implemented investments and only 70% of farmers planned to invest during the following five years. According to Rytsä (1998, 27), the most important reasons to refrain from investments are risk and uncertainty related to the investment, adequate current levels of production and inadequate investment support. According to the farmers' plans, especially investments in machinery and environmental investments were decreasing, while investments for additional land increased slightly. The withdrawal or reduction of investments and thus he giving up of the utilisation of technological development as a adjustment method may only work in the short term; according to Pehkonen and Mäkinen (1998), in the longer term this kind of behaviour leads to economic problems and the stopping of production.

The preference of the most important objectives and values had not altered during the five years. The most important objectives were ensuring liquidity, avoiding losses, taking care of the environment, improving the quality of life and reducing risk. The findings are in agreement with those of Hahtola (1971), Smith and Capstick (1976), Harper and Eastman (1976) and Gasson and Errington (1993) where objectives related to risk management were also emphasised.

The most important values were independence of work, versatility of work, the possibility to do work one likes, lifestyle and the possibility to earn reasonable incomes. The ranking is quite similar to the observations of Gasson's (1973) and Gillmor's (1986) studies, where intrinsic values were preferred to instrumental ones. The results also confirmed Gasson's (1973, 532) conclusion that smaller farms consider intrinsic values as being more important than bigger farms.

[1] Bookkeeping farms consist of about 1000, mainly full-time farms, whose average size is 40 hectares.

The most significant uncertainty factors were changes in agricultural policy, maintaining liquidity, variations in product prices, accidents and outlets of products. Compared with the studies of Patrick et. al. (1985), Meuwissen et. al. (1999) and Harwood et. al. (1999), Finnish farmers placed institutional and financial risk before production risk. This can be explained by the high level of support and its connection to institutional decision-making. According to Hardaker et. al. (1997, 262) the government usually increases the complexity of the farmers' operational environment.

The most important risk management strategies were maintaining adequate liquidity and solvency, and planning and controlling production and the economy. Compared with the studies of Patrick et. al. (1985) and Meuwissen et. al. (1999), Finnish farmers emphasised financial strategies somewhat more than production and marketing strategies. This may be due to the fact that before accession to the EU farmers were able to utilise only a limited number of production and marketing strategies to reduce risk, and even if farmers nowadays are able to use several production and marketing strategies, they may not be very familiar with them.

In this study, values and objectives seemed to be rather stable even when a big change has taken place in the operational environment. However, the drastic effect of the changeover from price support to direct income support depending on administrative decisions is reflected in the changes of objectives and values of farmers. Values are in nature very permanent, so the five year time period is rather short to observe the alteration of values. Nevertheless, even minor changes may reflect the direction of change. According to Gasson and Errington (1993, 105), objectives are less stable than values. This was confirmed in this study as well.

The objective of improving the quality of products was clearly less prioritised after membership of the EU compared to before, and correspondingly, the values associated with entrepreneurship were lower after joining the EU than before. The major reason behind this is the agricultural policy of the EU: direct income support is tied to the number of hectares and animals instead of the number and quality of agricultural products produced. Thus, the impact of entrepreneurship and quality of the economic result of the farm was greatly reduced after accession to the EU. The Agenda 2000 reform further increased the relative importance of subsidies for farmers' economic results. Timonen (2000, 153-156) has shown that entrepreneurship is positively correlated to success in the farm business. Also Sipiläinen et. al. (1998, 161) suggested that the Agenda 2000 reform might diminish the motivation of farmers.

On the other hand, objectives relating to the quality of life and leisure had became more important during the five years. This may originate in the general alteration of values in society which highlight quality and leisure in life. In addition, environ-

mental point of views seemed to be valued as more important with EU membership than before. This can be partly attributed to the farmers' high level of involvement in the agri-environmental support programme. Tamminen (1997) also reported a positive change in farmers' environmental attitudes.

In conclusion, in the light of this study, the agricultural policy of the EU may have reduced the value of entrepreneurship in the countryside and this can be noted in concrete terms, for instance, in the assessment of the importance of quality in production. In the longer term, if the current agricultural policy continues along similar lines, the value orientation of farmers may alter permanently.

The agricultural policy of the EU has been able to guarantee farmers a certain income level, even though their economic results and profitability have been decreasing within the EU (see Maatilatalouden yritys- ja tulotilasto 1998). However, one has to take into consideration the impact of change in farmers' values, objectives, attitudes and motivation when farmers' income formations have altered greatly. The agricultural policy of the EU tends to equalise farmers' economic results, because the quantity and quality of production have only partial influence on the economic result, while a great deal of the result is not tied to the success of farming. Therefore, the current situation does not provide enough incentives for farmers.

The current situation is not solely favourable for the consumer either; even if the policy is able to meet the objective of providing food for consumers at reasonable prices, consumers may have to compromise over the variety and quality of food, because the quality and variety of agricultural products are not objectives of the CAP (see Ritson 1997, 2). The BSE crises can be seen as the ultimate example of this. The magnitude of quality and safety in food production should be raised to include the quality aspect in the objectives of the CAP. In practice, to prevent the further decline in the motivation and entrepreneurship of farmers, the impact of entrepreneurship should be raised by reducing the magnitude of income support to farmers' income, or by adjusting the current form of income supports to provide more incentives for farmers.

The uncertainty associated with institutional risk had increased within the EU, while the significance of market risk had lowered during the five years. The diminished impact of production to farm income has decreased market risk, while the introduction of direct income support has increased institutional risk originating from agricultural policy. The change in managerial practice was only minor except for the increased utilisation of computers, which can be attributed to the common evolution of information technology in society.

In this study, all the components of the operational model, the production and economic factors of the farm, the characteristics of the farmer, and the operational environment had an influence on the farmers' decision-making on adjustment into the EU. The relative importance and magnitude of these factors greatly varied among different types of farms and farmers. This could be verified in the statistical tests complemented with the open questions in the questionnaire. In other words, farmers who utilised an alternative adjustment strategy for EU membership (maintaining current production, expanding current production, reducing current production, changing production lines, introducing additional processing for agricultural products, increasing off-farm incomes, or quitting) had different objectives, values, personalities as well as cognitive styles, their farms differed in relation to variety of production and economic factors, and they valued the significance of uncertainty factors differently.

The farm-related factors may limit or direct the alternative choices farmers have in strategic decision situations even in the longer term. Farmers have to take current production and economic factors, development possibilities and changes in the operational environment into account in their decision processes. Correspondingly, farmer-related issues may limit or offer new possibilities in strategic decision-making, Taking the strengths and weaknesses of the individual farm and farmer into account, farmers worked out their solutions based on the threats and possibilities within the environment. Thus, farmers seemed to take into consideration the elements presented in a strategic management study (see Porter 1998a and 1998b).

The size of the farm, as measured by the amount of arable area, number of animals and on-farm incomes; type of production, as measured by the main production line; and the economic situation of farm, as measured by the agricultural income and debt, affected the strategic decision-making of farmers. The farmers' basic education also had an influence on decisions. For example, the education of the farmer or his/her spouse affects the possibility of obtaining or increasing off-farm incomes, or the option to quit farming before retirement age.

The age of farmer and correspondingly the life cycle of the farm seem to be important factors when explaining the adjustment into the EU and is thus relevant to strategic decision-making. Most of the farms in Finland are family-farms, whose life cycle is connected to the life cycle and age of farmers. In the early phase, the farm is often developed and expanded, while at the exit stage, production is maintained or even declines. Such results have been reported by Potter and Lobley (1996) as well as Ylätalo et. al. (1998a, p. 168). Assurance of a successor may have more influence upon objectives and farm performance than the farmer's age (Gasson and Errington 1993, 96). Boehlje and Eidman (1984) as well as Carson (1988) suggested that the life cycle of the farm is an important element in farm management.

In this study, the assurance of a successor affected future decisions especially among the biggest group of farmers, farmers who had decided to maintain current production; the greater the assurance, the more certain these farmers were about future decisions. If a farmer has a successor, the future direction and continuity of the farm is better secured in the long term, and this is an important factor affecting the motivation of farmers to continue production and develop the farm. Farms having no successor tended to develop the farm and invest in it less than those farms, which had a successor assured. This kind of behaviour was also noted by Potter and Lobley (1992), who found that elderly farmers without successors had little incentive to expand, invest capital or even maintain production.

Uncertainty proved to be one of the key issues which influenced generation shifts. Thus, introducing institutional measures to reduce risk in farm management may be a more effective way to utilise a successful structural policy than by for instance using traditional measures of structural support. Farmers regarded institutional risk as the most significant factor causing uncertainty, so practising long-term, consistent support and structural policy reduces institutional risk and therefore affects the level of shifts from one generation to the next.

The results regarding attitudes toward risk in this study confirmed earlier outcomes (for instance Dillon and Scandizzo 1979; Meuwissen et. al. 1999) that the majority of farmers are risk averse. Attitudes towards risk have diminished during the five years in each group except amongst the expanded farms. Risk aversion had fallen most among reduced farms, among farms which increased off-farm incomes and among farms introducing additional processing for agricultural products. Expanded farms have invested more than other groups in basic agriculture and their family income is more dependent on farm income than other groups. Thus, the decision to expand combined with the big change in the operational environment led to higher risk aversion for the farmers who had expanded, while risk aversion decreased in other groups.

Even though the validity of the variable for measuring farmers' attitudes toward risk was not adequate, it seems that if the relative significance of agricultural production diminishes in family-farm life (diversification of the family's work and input outside traditional agriculture), risk aversion decreases. If investments and inputs in agricultural production increase, then the farmers' risk aversion will also increase. Thus, farm management is regarded as a risky business and this may be observed from the risk attitude behaviour of the farmers. Farmers who have expanded production may also be more familiar with the concept of risk than other farmers, because they have faced the risks when they made the decision to expand. This result is similar to that of Meuwissen et. al. (1999), where more risk averse farmers had larger farms. Correspondingly, Maikki and Somwaru (2001) observed

that higher risk farmers behaved in a more risk averse way than the average farmer when selecting yield and crop insurance.

The objective of developing the farm and production and the values of earning, the farming lifestyle, meaningful work and entrepreneurship in the countryside also seemed to be important factors when explaining the decision-making. Prioritisation of other objectives rather than developing did not differ significantly in relation to the adjustment decisions. The relative importance of the farmers' value orientation probably increases in the decision-making when the strategic and significant decisions problems are more long term. This is especially evident in family-farms where these decisions affect the whole family. Thus in strategic decisions aspects other than economic ones are involved in the decision-making, and their role may be emphasised or dominated if the problem is not easily structured, quantified, or assessed. For example, the decision to quit farming usually means that the farmer gives up the farming lifestyle and sometimes living in the countryside. This reason and the difficulty to find a substitute source of income in the countryside may be one reason behind why the actual decision to quit farming has been lower than the intention to quit farming according to several studies (see for instance Kuhmonen 1996; Kallinen and Heikkilä 1998; Ylätalo et. al. 1998a).

Correspondingly, except for life cycle, the farmers' valuation of entrepreneurship and earning as well as prioritisation of development explains why a particular group of farmers are developing their farms within the EU's operational environment while the majority of farmers have decided to maintain, reduce or quit production. Expanded farms seemed to be economically oriented with the aim of gaining profit and achieving profitable production by developing and expanding production. They regarded farming more as a business to be developed to gain profit than a lifestyle in order to maintain farming and to live in the countryside. Gasson and Errington (1993, 100) noted also that the preference of values alters according to the size of the farm business; intrinsic values were regarded as more important on smaller farms, while larger farms preferred instrumental and expressive aspects. The valuation of intrinsic values was highest among farmers who were about to quit production. Thus, the farmers' objectives and values in farming and the farm family explain to a considerable degree why certain decisions are taken on the farm.

Farmers who quit production were older, less educated, and utilised fewer modern management practices than the average farmer. Farmers who quit prioritised the objective of expanding and continuing production as well as reducing risk lower than other farmers, and assessed instrumental and expressive values as low but intrinsic values as high. The size and income of farms which had quit were somewhat smaller than average farms. The share of dairy and other crops farms was higher among farms which had quit than in the population. Pyykkönen (1999) also

concluded that the majority of farms which had quit had smaller incomes than farms on average. Kuhmonen (1996) as well as Keränen and Rytkönen (1996) noted that farms intending to quit were smaller in size than farms on average, and that the probability of quitting farming was higher for older farmers. Similar conclusions were also reached by Ylätalo et. al. (1998b, 86). They (1998b, p. 85) discovered that the majority of farmers who quit decided to retire after farming.

Age, life cycle and education did, however, only partly explain the decision to quit farming, because the age, life cycle and education of farmers who intended to quit production were quite average. In this study, the other explanatory factors for the decision to quit farming were the objective of developing the farm and production as well as the value of meaningful work.

The results of this study indicate that mere objectives, values, personality and cognitive style are not enough to explain the farmers' adjustment into the EU and therefore strategic decision-making. Correspondingly, the production and economic characteristics of farms do not explain farmers' strategic decision-making. Neither does the operational environment and changes to it explain their strategic decision-making. It is the combination and interaction of these factors that determines the strategic decision-making of farmers, though the magnitude of various factors and interaction between them varies in different contexts of decision-making and are always dependent upon the situation of the individual farmer and farm.

The diversity of the factors affecting farmers' decision-making complicates the understanding and prediction of their behaviour in strategic, long-term decision-making. Most of the farmer-related factors especially are qualitative and difficult to measure in a valid way. Gasson (1973) as well as Ruble and Cosier (1990) have also noted that individual characteristics of decision-makers in various decision situations produce different outcomes. Thus, farmers' decision-making is not easily examined using, for example, econometric models to predict changes and development in the agricultural structure. This can partly explain why these models fail to predict a farmers' economic behaviour especially in longer term situations. However, this study does indicates that these factors should be taken into account. The result does adhere to that of Gasson and Errington (1993, 112), who argued that the logic of decision-making for family-farms is more complex than for other types of farms. The magnitude of farmer-related, psychological factors in the decision-making is also stated by Willock et. al. (1999). As far as the theoretical approaches to decision-making are concerned, the results supported best the views of bounder rationality (Simon 1979) and the decision maker as an individual (Gasson 1973).

During the last decades the nature of farm-families has been evolving from the traditional farm-family, where each member of the family works on the farm, to

various other types of farm-families which have a diversity of solutions to apply to agriculture. The share of agricultural income of a farmers' total income has greatly decreased during the last decade (Väre 2000). According to Peltola (2000), the phenomenon of pluriactivity of farm-families is on the increase; in his study 56% of farms were pluriactive and 44% were full-time farms. The continuously altering operational environment which provides opportunities and threats as well as a diversity of factors affecting the farmers' decision-making indicates that the differentiation of farm-families in accordance with their adjustment strategy is also on the increase. Therefore, political macro level measures and instruments to guide Finnish agriculture and rural areas should be based on the same kind of strategy that farmers have chosen on a micro level, and should be as diverse and flexible as possible in order to meet the various solutions that farmers have chosen. Otherwise political level rural strategies only partly correspond to the farmers' objectives and requirements.

Family-farms especially consider adjustment at a family level instead of only a farm level. Therefore, the farm-family point of view should be underlined in addition to the farm business point of view in agricultural policy. Harper and Eastman (1980, 745-746) noted that farm goals may conflict with family goals in some cases, and that the family instead of the farm enterprise is the relevant unit of analysis. Fennell (1982, 34-35) has noted that the likelihood of having succession for a farm is affected both by the economic situation of the farm and the possibility to earn a satisfactory living outside farming. Thus, the question of the level of shift to the next generation is a matter of agricultural, rural and regional policy.

The interpretation of the results should be done in a qualified way. The relatively low response rate in the 1993 survey restricts the generalisation of the results even though the response rate was high in the 1998 follow-up survey. In addition, due to the restriction of the sample to somewhat larger than average farms in 1993, the results cannot be directly generalised for active farms and farmers. Taking these factors into consideration, the results of the study may be generalised as active farms, which are somewhat larger in size than average farms in Finland, and to farmers who are better educated than average farmers.

The validity of the variables which demanded the farmers' assessment was less than the validity of other variables, even though the validity was enhanced by employing several variables measuring the same issue and the individual variables of objectives and values were combined to improve the validity of the measurement. The subjective component within the multivariate methods might also lower the validity of the results.

The survey methodology employed in this study did not allow control of the response situation, so it is not evident what farmers actually meant when they were

assessing the importance of objectives and values. For instance, the possibility that some farmers have paid sequential attention to goals (see, for instance, Simon 1979) and some have not lowers the validity of the measurement and might affect the results and conclusions. Similarly, the different cognitive styles of farmers may have an influence on the assessment of objectives and values. Öhlmer et. al. (1993, 52) have reported the difficulty in directly observing the cognitive processes of farmers. Korhonen et. al. (1990, 177) noted that the form of presentation can affect the decision-makers' processing strategy. The decision-makers may act in a variety of ways if they have different perceptions of the decision situation due to unequal access to information or varying interpretations of it (Casson 1982).

The direction of the influence between decision-making in the EU and values or objectives was not fully evident in all cases. The independent variable, adjustment into the EU, was measured only once in 1998, while dependent variables were measured twice: in 1993 and in 1998. Thus, it was not possible to conclude from the available data, which variable had changed first but the argument was made on a theoretical basis. Objectives and values directly or indirectly influence the decision-making, although in some cases in the longer term the direction of influence can be the other way around as well. The latter direction, however, is not so obvious and the values especially can be regarded as very stable. The stability of values and objectives in this study could also be verified by the rather minor changes in objectives and values between 1993 and 1998.

The continuous change and increased level of uncertainty in the farmers' operational environment seems to be a permanent phenomenon at least for the near future. The studies of Kallio (1997) and Mäkinen (1999) indicate that the changes in the operational environment of the EU have increased stress for farmers. The surveys in this study were carried out during periods of this kind of uncertain operational environment. Thus, the validity and generalisation of the results due to the changes in the operational environment may be considered to be adequate.

7. Summary

Finland's accession to the European Union (EU) at the beginning of 1995 without a transitional period was one of the biggest changes for the Finnish agricultural sector, and therefore for farmers. The new operational environment of the EU required farmers either consciously or unconsciously to make decisions concerning adjustment into the EU. Their decisions on adjustment may be classified into maintaining farms, expanding farms, reducing farms, farms changing the production line, farms introducing additional processing for agricultural products, farms increasing off-farm incomes and quitting production.

This study aimed at explaining farmers' decision-making on adjustment into the EU, and examining changes in their objectives, values, attitudes toward risk, managerial issues, and the significance of risk factors in the changing operational environment. The theoretical model of farmers' strategic decision-making, based on the theory of risk, uncertainty and decision-making as well as previous studies, was introduced and operationalised by their decision-making. The model consisted of production and economic factors of the farm, farmer-related factors, the operational environment and decision-making.

The empirical data for the study consisted of three sets of data. A postal survey in 1993 was conducted for active Finnish farmers with at least 10 hectares of arable land. In 1998, a follow-up survey was carried out for the same set of farmers who responded to the 1993 survey. Altogether 415 farmers responded to both surveys. These two data sets were complemented and validated by the data received from the rural business register. Several statistical tests were applied to test the operational model.

Almost half of the farmers had maintained current production, one fifth had expanded production and 15% had quit production. The tests indicated that the production and economic factors of the farm, characteristics of the farmer and the operational environment affected decision-making on adjustment into the EU. The magnitude and interaction of these factors seemed to vary from one farm and farmer to another. This was also confirmed by an open question, where farmers stated the major factors behind their solutions to adjustment. The assurance of a successor in family-farms affected farmers' decision-making because strategic decisions usually extend to the next generation. It was found that farmers' objectives related to development and risk management as well as their value orientation which partly explained why farmers' committed in different ways when making decisions on adjustment to the EU. The importance of values in decision-making seems to increase the more long-term, strategic and significant the problems are.

The most important objectives and values had remained same during the five-year period. The most important objectives were those associated with risk management and the most important values were intrinsic values, like independence, versatility of work and the possibility to do work one likes. However, farmers' objectives and values had altered somewhat upon joining the EU compared with the time before membership. Values associated with entrepreneurship and the objective of improving the quality of products had been less prioritised, while objectives related to the quality of life and leisure as well as environmental issues had been prioritised higher in the operational environment of the EU. These changes were quite similar for each group making decisions on adjustment. The major reason behind these changes was the introduction of the EU common agricultural policy (CAP), which greatly altered the farmers' operational environment between 1993 and 1998.

Risk aversion had lowered in each group of decision-makers except among expanding farms, where risk aversion had increased. Changes in managerial issues were minor except for the utilisation of computers, which had increased greatly during the five years. The significance of institutional risk had increased, while market risk was regarded as less important to farmers now in the EU than before membership.

Selostus: Maatilayrittäjien EU-sopeutumiseen liittyvä päätöksenteko

Riski ja epävarmuus ovat lisääntyneet suuresti Suomen maataloudessa 1990-luvulla. Epävarmuus oli suurimmillaan ennen Suomen liittymistä Euroopan Unioniin (EU), koska etukäteen oli tiedossa, että liittyminen vaikuttaisi suuresti Suomen maatalouteen ja maatilayrityksiin. Suomen liittyminen EU:hun vuoden 1995 alussa ilman siirtymäaikaa on suurimpia yksittäisiä muutoksia, jotka ovat kohdistuneet Suomen maatalouteen ja sitä kautta yksittäisiin maatilayrityksiin. Suomen maatalouden siirtyminen osaksi EU:n maatalouspolitiikkaa laski merkittävästi maataloustuotteiden tuottajahintoja ja lisäsi tuotteiden hintavaihtelua. Tuottajahintojen alentamisesta aiheutuvat tulonmenetykset pyrittiin korvaamaan maatilayrittäjille erilaisilla sopeuttamistoimenpiteillä, joista suorat EU-tuet ja kansalliset tuet ovat merkittävimpiä. Suorilla tuilla ei kuitenkaan kyetty kokonaan kompensoimaan tuottajahintojen laskusta aiheutuvaa tulonmenetystä. Vuoden 2000 alussa voimaan tullut Agenda 2000 lisäsi edelleen suorien tukien merkitystä maatilayrittäjien tulonmuodostuksessa. Kaikkiaan EU:n tuoma muutos maatilayrittäjien toimintaympäristöön on lisännyt huomattavasti institutionaalista riskiä maataloudessa.

Muuttuneessa toimintaympäristössä maatilayrittäjien oli ratkaistava maatilayrityksensä sopeutuminen joko tietoisesti tai tiedostamatta. Vaihtoehtoina ovat nykyisen tuotannon ylläpitäminen, tuotannon laajentaminen, tuotannon vähentäminen, tuotantosuunnan vaihtaminen, sivu- ja liitännäiselinkeinojen tai jatkojalostuksen kehittäminen, maatalouden ulkopuolisten tulojen lisääminen tai tuotannon lopettaminen. Päätös on strateginen ja hyvin kriittinen tilalle sekä viljelijäperheelle. Tämänkaltaisessa päätöstilanteessa yksinomaan voiton maksimointiin perustuvat päätösmallit ovat riittämättömiä selittämään maatilayrittäjien päätöksiä.

Tutkimuksen tavoitteena on selittää, mitkä tekijät vaikuttavat maatilayrittäjien EU-sopeuttamispäätökseen. Toisena tavoitteena on tarkastella miten muuttuva toimintaympäristö on vaikuttanut maatilayrittäjien tavoitteisiin, arvoihin, suhtautumiseen riskiin, liikkeenjohdollisiin tekijöihin sekä arviointiin eri riskitekijöiden merkittävyydestä. EU-sopeuttamispäätöksenteko yleistetään koskemaan maatilayrittäjien strategista päätöksentekoa.

Tutkimuksen teoreettinen malli perustuu teoriaan riskistä, epävarmuudesta ja päätöksenteosta sekä aikaisempiin tutkimuksiin. Malli koostuu maatilayrityksen tuotannollista ja taloudellisista tekijöistä, maatilayrittäjästä päätöksentekijänä, päätöksenteosta sekä toimintaympäristöstä. Malli operationalisoidaan maatilayrittäjien EU-sopeuttamispäätöksenteoksi.

Tutkimuksen empiirinen aineisto koostuu kolmesta osasta. Perustana on vuonna 1993 vähintään 10 hehtaarin aktiivitiloille osoitettu postikysely, johon vastasi 547 tilaa vastausprosentin ollessa 45. Kyseiselle tiloille suoritettiin vuonna 1998 jatkokysely, johon 415 tilaa vastasi, jolloin vuoden 1998 kyselyn vastausprosentiksi muodostui 89%. Aineistoa täydennettiin ja sitä validoitiin maaseutuelinkeinorekisterin tiedoilla.

Aineiston tavoite- ja arvomuuttujille suoritettiin pääkomponenttianalyysi ja analyysissa saadut uudet muuttujat analysoitiin ja nimettiin. EU-sopeuttamispäätöksenteko-muuttujan suhdetta maatilayritystä, maatilayrittäjää ja toimintaympäristöä mittaaviin muuttujiin testattiin F- ja χ^2-testeillä. Maatilayrittäjien tavoitteisiin, arvoihin, suhtautumiseen riskiin, liikkeenjohdollisiin tekijöihin sekä arviointiin eri riskitekijöiden merkitsevyydestä liittyviä muutoksia selvitettiin t-testillä.

Tässä tutkimuksessa maatilayrittäjien EU-sopeuttamispäätös jakaantui nykyisen tuotannon ylläpitäjiin (44%), tuotannon laajentajiin (20%), tuotannon lopettaneisiin (15%), maatalouden ulkopuolisia tuloja lisänneisiin (10%), tuotantosuunnan vaihtaneisiin (5%), tuotannon vähentäjiin (3%) ja sivu- ja liitännäiselinkeinoja tai jatkojalostusta kehittäneisiin (3%). Tuotannon ylläpitäjistä osa ei ollut vielä tehnyt lopullista ratkaisua vaan oli epävarma tilan tulevaisuudesta. Tämä oli yhteydessä epävarmuuteen tilan jatkajasta ja havaittavissa pidättäytymisaikomuksena tulevista investoinneista.

Tavoitteiden ja arvojen tärkeysjärjestys ei ollut juurikaan muuttunut viiden vuoden aikana. Tärkeimmät tavoitteet olivat riskinhallintaan liittyviä tavoitteita ja tärkeimmät arvot olivat maatilayrittämisen perusluonteeseen liittyvä arvoja, kuten työn itsenäisyys, monipuolisuus ja mahdollisuus tehdä haluamaansa työtä. Sen sijaan institutionaalisen riskin merkitys oli korostunut, kun taas markkinariskin merkitys oli pienentynyt viiden vuoden kuluessa. Riskin karttaminen oli vähentynyt viiden vuoden kuluessa kaikilla muilla ryhmillä paitsi laajentaneilla. Liikkeenjohdollisissa tekijöissä ei ollut tapahtunut merkittäviä muutoksia lukuun ottamatta tietokoneen hyväksikäytön huomattavaa kasvua maatilayrityksissä.

Huolimatta siitä, että tavoitteiden ja arvojen priorisointi ei ollut suuresti muuttunut, voitiin havaita toimintaympäristön suuresta muutoksesta aiheutuvia muutoksia. Yrittäjyyteen liittyvien arvojen arvostus oli laskenut EU:ssa ja vastaavasti tuotteiden laadunparantamiseen liittyvien tavoitteiden merkitys oli selvästi pienentynyt. Sen sijaan elämänlaatua ja vapaa-aikaa korostettiin enemmän 1998 kuin 1993. Myös ympäristönhoitoon liittyvien asioiden arvostus oli lisääntynyt EU-aikana. Nämä muutokset olivat samansuuntaisia kaikissa EU-sopeuttamispäätöksentekoryhmissä.

Tutkimuksessa todettiin, että vaikka EU:n maatalouspolitiikka on jossain määrin kyennyt huolehtimaan maatilayrittäjien tulotasosta, ei tulonmuodostuksessa tapahtuneen suuren muutoksen vaikutusta maatilayrittäjien arvoihin, tavoitteisiin, asenteisiin ja motivaatioon ole otettu huomioon. Nykyinen maatalouspolitiikka tasapuolistaa maatilayrittäjien tuloksia. Tuotannon määrällä ja laadulla on vain osittainen vaikutus tulokseen suuren osan tuloista tullessa riippumatta siitä, miten hyvin maatilayrittämisessä onnistutaan. Maataloustuotteiden laadun ja turvallisuuden merkitystä tulisikin korostaa ottamalla ne mukaan osaksi EU:n maatalouspolitiikan tavoitteita. Jotta maatilayrittäjien yrittäjyyden ja motivaation lasku voitaisiin käytännössä pysäyttää, tulisi suoran tulotuen osuutta viljelijän tulomuodostuksessa pienentää tai muuttaa tulotukien nykyistä muotoa sellaiseksi, joka kannustaisi maatilayrittäjiä nykyistä enemmän.

EU-sopeuttamispäätöksen todettiin olevan yhteydessä maatilayrityksen tuotannolliseen ja taloudelliseen tilanteeseen, maatilayrittäjän ominaisuuksiin ja toimintaympäristön muutoksiin. Näiden eri tekijöiden tärkeys ja suhteellinen merkitys vaihteli suuresti maatilayrityksestä ja maatilayrittäjästä riippuen. Tämä seikka voitiin myös todeta avoimella kysymyksellä, jossa maatilayrittäjiltä tiedusteltiin tärkeimpiä syitä sopeuttamispäätökseen. Varmuus jatkajasta perheviljelmissä vaikutti maatilayrittäjien päätöksentekoon, koska strategiset päätökset yleensä kohdistuvat seuraaville sukupolville asti. Tiloilla, joilla ei ollut jatkajaa tiedossa, oli alhaisempi kehittämis- ja investointihalukkuus ja tulevaisuus nähtiin epävarmempana kuin tiloilla, joilla oli jatkaja tiedossa. Koska jatkamishalukkuus on yhteydessä epävarmuuteen toimintaympäristössä, ja koska maatilayrittäjät pitivät institutionaalista riskiä merkittävimpänä epävarmuustekijänä, pystyisi valtiovalta parhaiten edistämään sukupolvenvaihdoksia toimenpiteillä, jotka vähentävät institutionaalista, maatalouspolitiikasta aiheutuvaa riskiä.

Tutkimuksessa havaittiin, että maatilayrittäjien kehittämiseen ja riskinhallintaan liittyvät tavoitteet sekä arvot selittivät osin sen, miksi maatilayrittäjät tekivät erilaisia EU-sopeutumisratkaisuja. Arvojen merkitys päätöksenteossa vaikuttaisi kasvavan mitä strategisemmasta ja merkittävämmästä sekä mitä pidemmän aikavälin päätösongelmasta on kysymys. Täten maatilayrittäjien strategista päätöksentekoa ei voida selittää yksinomaan maatilayrityksen liittyvillä taloudellisilla ja tuotannollisilla tekijöillä vaan myös maatilayrittäjään ja maatilaperheeseen liittyvät tekijät tulee huomioon ottaa.

Tulosten yleistettävyyteen koskemaan kaikkia Suomen maatilayrityksiä ja maatilayrittäjiä tulee suhtautua varauksellisesti. Kyselyn suuntaaminen keskimääräistä suuremmille tiloille ja vuoden 1993 kyselyn suhteellisen alhaisen vastausprosentin vuoksi tulokset voidaan yleistää hieman keskimääräistä suurempiin tiloihin ja keskimääristä paremmin koulutettuihin maatilayrittäjiin. Myös vastaajan arviota

vaativien kysymysten validiteettiin sekä monimuuttujamenetelmien tuloksiin menetelmiin liittyvän subjektiivisuuden vuosi tulee suhtautua varauksella.

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Appendices

Appendix 1

STUDY OF RISK AND DECISION-MAKING

Questionnaire:

Instructions: Please circle the alternative you consider to be correct on questions where alternatives are given.

A. Background questions

A.1. Year of birth? Year _____

A.2. What is your sex ?
1 Male
2 Female

A.3. What is your basic education?
1 Elementary school
2 Basic school
3 Secondary school

A.4. What is your agricultural education?
1 No agricultural education
2 Courses etc. in agriculture
3 Agricultural school
4 Agricultural college
5 Agricultural university

A.5. Do you have education other than agricultural education?
1 No other education
3 Vocational school
4 Collage level degree
5 University level degree

A.6. What is your own arable area of your farm? Hectares _____

A.7. What is the average rented arable area of your farm? Hectares _____

A.8. What is the average arable area of your farm? Hectares _____

A.9. What is the productive forest area of your farm ? Hectares _____

PLEASE TURN OVER

A.10. What is the most important agricultural source of income on your farm / And what is the second most important source of income in agriculture? (Agricultural incomes here means incomes in taxation form 2). Please circle the most and the second most important source of income.

	Most important	Second most important
Grain production	1	1
Potato production	2	2
Sugar beet production	3	3
Horticulture	4	4
What? _____		
Organic plant production	5	5
What? _____		
Other plant production	6	6
What? _____		
Milk production	7	7
Beef production	8	8
Pork production	9	9
Pig production	10	10
Egg production	11	11
Poultry production	12	12
What? _____		
Sheep production	13	13
Organic milk production	14	14
Organic meat production	15	15
What? _____		
Other animal production	16	16
What? _____		
Forestry	17	17
Other source of agricultural income	18	18
What? _____		
Secondary occupation in agriculture	19	19
What? _____		

A.11. What is the average number of animals on your farm in a year. If you do not have animals, please move to the next question.

Dairy cows	_____	units
Beef cattle	_____	units
Suckler cows	_____	units
Feeder hogs	_____	feeding places
Sows	_____	units
Chickens	_____	units
Poultry	_____	units
Sheep	_____	units

A.12. How much is the share of off-farm incomes of all incomes of your family?
1 No significant off-farm incomes
2 Under 25% of all incomes
3 25-50% of all incomes
4 Over 50% of all incomes

A.13. Off-farm incomes consist mainly of (Please circle the most and the second most important source of income)

	Most important	**Second most important**
Earned income	1	1
Professional income (Taxation form 5)	2	2
Business gain (Taxation form 6)	3	3
Income from capital	4	4
No off-farm incomes	5	5

A.14. Who in your family have off-farm incomes?
1 Mainly spouse
2 Mainly primary entrepreneur
3 Both
4 No off-farm incomes

A.15. Does your family have the possibility to get more off-farm incomes?
1 No, because off-farm incomes are not available
2 No, because current work contribution is required for the farm
3 Yes
4 Unable to say

A.16. In what type of area is your farm located?
1 In an urban area
2 In a rural area
3 Near a populated area (less than 5 kilometre to the populated area)
4 In a sparsely populated area (over 5 kilometre to the populated area)

A.17. What is the family status?
1 Single
2 Married, no children
3 Married, children

A.18. Do your children participate in agricultural work on your farm?
1 Regularly
2 Occasionally (during vocations etc.)
3 Do not participate
4 No children

A.19. Do you have hired staff on your farm (outside family)?
1 No
2 Yes, not more than one man year in a year
3 Yes, over one man year in a year

PLEASE TURN OVER

A.20. How many years ago did the shift from the previous generation on your farm take place? _____Years

A.21. When is the probable timing of the hand over to the next generation on your farm ?
1 After 0-5 years
2 After 5-15 years
3 After 15-25 years
4 Over 25 years
5 Farm quits production

A.22. Do you have a successor for the farm?
1 Yes
2 Uncertain
3 Not known

B.1. How often do you utilise a computer on the farm?
1 Regularly (at least once a week)
2 Once a week – once a month
3 Occasionally during the year
4 I don't use a computer on the farm

B.2. How do you manage your bookkeeping for taxation?
1 Myself / with the family by computer
2 Myself / with the family by hand
3 Outside service used (accounting office etc.)

B.3. Did you make a budget for 1993?
1 Yes
2 No

B.4. How much is your family debt? _____FIM

B.5. How much were your agricultural incomes in 1992 (taxation form 2, entries 1-8)? _____FIM

B.6. How much was the clear profit from forestry in 1992 (taxation form 2A, entry 5)? _____FIM

B.7. How much are the expenditures of your private household a year? _____FIM

B.8. How much is the average interest on your debt?
1 under 6 per cent
2 6-9 per cent
3 9-12 per cent
4 over 12 per cent

B.9. How big are your short term (term of loan is less than one year) debts of all debts?
1 under 25 percent
2 25-50 percent
3 over 50 percent

B.10. How much time do you spend on planning and control of production and economy during wintertime?
1 0-2 hours a week
2 2-5 hours a week
3 5-10 hours a week
4 11-20 hours a week
5 over 20 hours a week

B.11. Have you written down (on paper) the objectives of your farm and family?
1 Yes
2 No

B.12. Does your farm have cooperation with other farms at the moment?
1 Not significantly
2 No cooperation, but jointly owned property
3 Yes, cooperation and jointly owned property

B.13. Which are the two most important sources for you to obtain information on agriculture (Please circle the most and the second most important source of information).

	Most important	**Second most important**
Professional literature	1	1
Advisory organisations and clubs	2	2
Agricultural newspapers and magazines	3	3
Radio / television	4	4
Neighbours, friends	5	5
Agricultural salesman	6	6
Other, what? _____	7	7

B.14. If Finland joins the European Community (EU), then agriculture faces considerably more threats than possibilities. What is your opinion on this?
(Answer using scale 1 to 5 so that 1=Fully agree and 5=Fully disagree).

Fully agree 1 2 3 4 5 Fully disagree

B.15. Society regulates agriculture by several means. Do you think that the regulation of society in agriculture should be altered?

Regulation should be increased considerably 1 2 3 4 5 Regulation should be decreased considerably

B.16. It has been proposed that the quota system in agriculture be changed so that quotas are transferred from one farm to another using compensation, thus offering the possibility to purchase and sell quotas freely. What is your opinion on the proposal?

Fully agree 1 2 3 4 5 Fully disagree

PLEASE TURN OVER

C. Objectives:

Objectives (criteria for decision-making) mean factors, which are important to achieve. Assess the importance of the following objectives on your farm and your family at the moment and in five years time.

		AT THE MOMENT		IN 5 YEARS TIME	
		Very important	Not important	Very important	Not important
Increasing farm size	(c101)	1 2 3 4 5 6		1 2 3 4 5 6	
Ensuring continuity	(c102)	1 2 3 4 5 6		1 2 3 4 5 6	
Improving quality of life	(c103)	1 2 3 4 5 6		1 2 3 4 5 6	
Decreasing taxes	(c104)	1 2 3 4 5 6		1 2 3 4 5 6	
Increasing profit	(c105)	1 2 3 4 5 6		1 2 3 4 5 6	
Health	(c106)	1 2 3 4 5 6		1 2 3 4 5 6	
Improving return of capital	(c107)	1 2 3 4 5 6		1 2 3 4 5 6	
Avoiding losses	(c108)	1 2 3 4 5 6		1 2 3 4 5 6	
Increasing leisure	(c109)	1 2 3 4 5 6		1 2 3 4 5 6	
Expanding production	(c110)	1 2 3 4 5 6		1 2 3 4 5 6	
Improving quality of products	(c111)	1 2 3 4 5 6		1 2 3 4 5 6	
Increasing assets	(c112)	1 2 3 4 5 6		1 2 3 4 5 6	
Social recognition and respect	(c113)	1 2 3 4 5 6		1 2 3 4 5 6	
Ensuring liquidity	(c114)	1 2 3 4 5 6		1 2 3 4 5 6	
Taking care of the environment	(c115)	1 2 3 4 5 6		1 2 3 4 5 6	
Increasing total incomes	(c116)	1 2 3 4 5 6		1 2 3 4 5 6	
Maintaining a low degree of debt to assets	(c117)	1 2 3 4 5 6		1 2 3 4 5 6	
Increasing household spending	(c118)	1 2 3 4 5 6		1 2 3 4 5 6	
Obtaining new and bigger machinery+buildings	(c119)	1 2 3 4 5 6		1 2 3 4 5 6	
Improving result year by year	(c120)	1 2 3 4 5 6		1 2 3 4 5 6	

D. Uncertainty factors:

Economic results on a farm vary due to uncertainty. Results can be better or worse than expected. In agriculture, variation of results is affected by several factors. Assess the significance of the following uncertainty factors on your farm at the moment and in five years time.

		AT THE MOMENT		IN 5 YEARS TIME	
		Very significant	Not significant	Very significant	Not signif.
Price variations of inputs	(d101)	1 2 3 4 5 6		1 2 3 4 5 6	
Diseases and pests	(d102)	1 2 3 4 5 6		1 2 3 4 5 6	
Availability of funding	(d103)	1 2 3 4 5 6		1 2 3 4 5 6	
Changes in taxation legislation	(d104)	1 2 3 4 5 6		1 2 3 4 5 6	

		AT THE MOMENT						IN 5 YEARS TIME					
		Very significant					Not significant	Very significant					Not signif.
Fire, theft	(d105)	1	2	3	4	5	6	1	2	3	4	5	6
Adequacy of funding in the long term	(d106)	1	2	3	4	5	6	1	2	3	4	5	6
Outlet of products	(d107)	1	2	3	4	5	6	1	2	3	4	5	6
Fluctuation of interest	(d108)	1	2	3	4	5	6	1	2	3	4	5	6
Cultivation assurance of varieties	(d109)	1	2	3	4	5	6	1	2	3	4	5	6
Technological development	(d110)	1	2	3	4	5	6	1	2	3	4	5	6
Changes in world policy	(d111)	1	2	3	4	5	6	1	2	3	4	5	6
Adequacy of business skills	(d112)	1	2	3	4	5	6	1	2	3	4	5	6
Adequacy of securities	(d113)	1	2	3	4	5	6	1	2	3	4	5	6
Gap between planned and actual prices	(d114)	1	2	3	4	5	6	1	2	3	4	5	6
Variability of animal material quality	(d115)	1	2	3	4	5	6	1	2	3	4	5	6
Availability of additional incomes	(d116)	1	2	3	4	5	6	1	2	3	4	5	6
Availability of outside staff	(d117)	1	2	3	4	5	6	1	2	3	4	5	6
High level of inflation	(d118)	1	2	3	4	5	6	1	2	3	4	5	6
Existing investments	(d119)	1	2	3	4	5	6	1	2	3	4	5	6
Successor	(d120)	1	2	3	4	5	6	1	2	3	4	5	6
Degree of debt to own capital	(d121)	1	2	3	4	5	6	1	2	3	4	5	6
Joining the European Union (EU)	(d122)	1	2	3	4	5	6	1	2	3	4	5	6
Adequacy of education and professional skill	(d123)	1	2	3	4	5	6	1	2	3	4	5	6
Necessity to make short term investment	(d124)	1	2	3	4	5	6	1	2	3	4	5	6
Conflict between family and farm objectives	(d125)	1	2	3	4	5	6	1	2	3	4	5	6
Price variations of outputs	(d126)	1	2	3	4	5	6	1	2	3	4	5	6
Animals becoming ill	(d127)	1	2	3	4	5	6	1	2	3	4	5	6
Weak national economy	(d128)	1	2	3	4	5	6	1	2	3	4	5	6
Low level of inflation	(d129)	1	2	3	4	5	6	1	2	3	4	5	6
Changes in agricultural policy	(d130)	1	2	3	4	5	6	1	2	3	4	5	6
Funding in the short term	(d131)	1	2	3	4	5	6	1	2	3	4	5	6
Injuries	(d132)	1	2	3	4	5	6	1	2	3	4	5	6
Production quotas	(d133)	1	2	3	4	5	6	1	2	3	4	5	6
Price level between inputs and outputs	(d134)	1	2	3	4	5	6	1	2	3	4	5	6
Measures to limit production	(d135)	1	2	3	4	5	6	1	2	3	4	5	6
Availability and quality of information	(d136)	1	2	3	4	5	6	1	2	3	4	5	6
Costs	(d137)	1	2	3	4	5	6	1	2	3	4	5	6
Weather variations	(d138)	1	2	3	4	5	6	1	2	3	4	5	6
Conflict between the objectives of family	(d139)	1	2	3	4	5	6	1	2	3	4	5	6
Health	(d140)	1	2	3	4	5	6	1	2	3	4	5	6
Increasing requirement to market	(d141)	1	2	3	4	5	6	1	2	3	4	5	6
High level of household spending	(d142)	1	2	3	4	5	6	1	2	3	4	5	6
Changes in environmental legislation	(d143)	1	2	3	4	5	6	1	2	3	4	5	6
Information technology skills and knowledge	(d144)	1	2	3	4	5	6	1	2	3	4	5	6
Management of quality of products	(d145)	1	2	3	4	5	6	1	2	3	4	5	6
Costs of debt	(d146)	1	2	3	4	5	6	1	2	3	4	5	6

PLEASE TURN OVER

D.2. What are the factors causing changes of the significance of uncertainty factors?

_____
_____
_____

E. Risk management methods:

Uncertainty can be managed and reduced in several ways. Assess the importance of the following methods to manage and reduce uncertainty on your farm.

		Very Important					Not important
Cooperation between farms	(e1)	1	2	3	4	5	6
Low level of debt to assets	(e2)	1	2	3	4	5	6
Contract production	(e3)	1	2	3	4	5	6
Diversification	(e4)	1	2	3	4	5	6
Planning of investments	(e5)	1	2	3	4	5	6
Exercising stable production	(e6)	1	2	3	4	5	6
Insurance	(e7)	1	2	3	4	5	6
Part-time farming	(e8)	1	2	3	4	5	6
Planning and control of production	(e9)	1	2	3	4	5	6
Planning and control of marketing of products	(e10)	1	2	3	4	5	6
Acquisition of information	(e11)	1	2	3	4	5	6
Introducing additional processing of products on farm	(e12)	1	2	3	4	5	6
Unused credit reserves	(e13)	1	2	3	4	5	6
Exercising flexible production	(e14)	1	2	3	4	5	6
Increasing education and knowledge	(e15)	1	2	3	4	5	6
Low level of debt to turnover	(e16)	1	2	3	4	5	6
Dividing sales into periods	(e17)	1	2	3	4	5	6
Planning and control of economy	(e18)	1	2	3	4	5	6
Maintaining savings	(e19)	1	2	3	4	5	6
Maintaining liquidity	(e20)	1	2	3	4	5	6
Low level of short term loan to all loans	(e21)	1	2	3	4	5	6
Acquiring additional incomes	(e22)	1	2	3	4	5	6

F. Expectations:

F.1. How do you estimate the price of your main product (see question A.10) to develop in a year?

1 Price is over 10 per cent higher than the current price in a year
2 Price is 0-10 per cent higher than the current price in a year
3 Price is 0-5 per cent lower than the current price in a year
4 Price is over 5 than less than 10 per cent lower than the current price in a year
5 Price is 10-20 per cent lower than the current price in a year
6 Price is over 20 per cent lower than the current price in a year

F.2. Please explain your answer to the preceding price estimation.

_____
_____
_____

G. Decision problems:

G.1. In agriculture, several decisions concerning farm economy and production are made. The decision can be very significant or less significant. Assess the importance of the following decisions for your farm.

		Very significant					Not significant
Planning of investments	(g101)	1	2	3	4	5	6
Planning of yearly production	(g102)	1	2	3	4	5	6
Budgeting	(g103)	1	2	3	4	5	6
Selection of plants and varieties	(g104)	1	2	3	4	5	6
Planning of work and leisure time	(g105)	1	2	3	4	5	6
Planning of liquidity	(g106)	1	2	3	4	5	6
Planning of taxation	(g107)	1	2	3	4	5	6
Planning of plant rotation	(g108)	1	2	3	4	5	6
Planning of marketing	(g109)	1	2	3	4	5	6
Planning of feeding	(g110)	1	2	3	4	5	6
Assessment of profitability	(g111)	1	2	3	4	5	6
Long term planning	(g112)	1	2	3	4	5	6
Planning of fertilisation	(g113)	1	2	3	4	5	6
Planning of plant protection	(g114)	1	2	3	4	5	6

G.2. Which decision problems do you assess to be the most likely to require outside help (advises). Please mark the three most important matters.

	Most Important	**Second most important**	**Third most important**
Planning of investments	1	2	3
Planning of yearly production	1	2	3
Budgeting	1	2	3
Selection of plants and varieties	1	2	3
Planning of work and leisure time	1	2	3
Planning of liquidity	1	2	3
Planning of taxation	1	2	3
Planning of plant rotation	1	2	3
Planning of marketing	1	2	3
Planning of feeding	1	2	3
Assessment of profitability	1	2	3
Long term planning	1	2	3
Planning of fertilisation	1	2	3
Planning of plant protection	1	2	3

PLEASE TURN OVER

G.3. Many kinds of planning and control methods may be used in farm management. Some of these are listed below. Please assess the significance of each method for your farm by circling the most suitable alternative.

	Used regularly	Used occasionally	Method known but not used	Method not known
Cross-margin method	1	2	3	4
Linear optimisation	1	2	3	4
Budgeting	1	2	3	4
Production cost calculation	1	2	3	4

H. Values:

Characteristics associated with farming are presented in the following. How they reflect your values in farming?

		Very important					Not important
Healthy lifestyle	(h1)	1	2	3	4	5	6
Possibility to gain profit	(h2)	1	2	3	4	5	6
Outdoor life	(h3)	1	2	3	4	5	6
Independence of work	(h4)	1	2	3	4	5	6
Respect received from work	(h5)	1	2	3	4	5	6
Possibility to work from home with the family	(h6)	1	2	3	4	5	6
Creativeness of work	(h7)	1	2	3	4	5	6
Entrepreneurship	(h8)	1	2	3	4	5	6
Possibility to develop oneself	(h9)	1	2	3	4	5	6
Possibility to take risks	(h10)	1	2	3	4	5	6
Belonging to a farm community	(h11)	1	2	3	4	5	6
Environmentally friendly production	(h12)	1	2	3	4	5	6
Job assurance	(h13)	1	2	3	4	5	6
Challenge in work	(h14)	1	2	3	4	5	6
Continuing family farm	(h15)	1	2	3	4	5	6
Possibility to express oneself	(h16)	1	2	3	4	5	6
Possibility to expand production	(h17)	1	2	3	4	5	6
Safety in work	(h18)	1	2	3	4	5	6
Possibility to earn reasonable incomes	(h19)	1	2	3	4	5	6
Possibility to do work one likes	(h20)	1	2	3	4	5	6
Entrepreneurship without risk	(h21)	1	2	3	4	5	6
Responsibility for work	(h22)	1	2	3	4	5	6
Possibility to work as one chooses	(h23)	1	2	3	4	5	6

I. Attitudes toward risk:

The following presents examples of questions aimed at testing respondents attitudes toward risk. Please circle the alternative which is the most agreeable to you. (Note that there is no 'right' answer to the questions).

I.1. You are selling barley. You may sell barley immediately, when the price is fixed at FIM 1,80/kilogram or alternatively sell barley after three months, when there is a 50% chance that the price will be FIM 2,00/kilogram or FIM 1,70/kilogram. Which one would you choose?
1 Sell immediately
2 Sell after three months

I.2. You are filling in your taxation form. The tax in 1992 will be FIM 100 000. You may, however, make an investment for accounts, which may not be deductible. The chance that it will be deductible is 50%, and then the amount of tax will be FIM 60 000. If the investment is not deductible (50% chance), the amount of tax will increase to FIM 120 000. Which alternative would you choose?
1 Not to make an investment
2 Make an investment

I.3. Would you pay FIM 50 for a lottery ticket, where you win FIM 100 for only every other ticket (50%) and nothing for the other ticket?
1 Yes
2 No

I.4. How much would you be willing to pay for the lottery ticket above? _____ FIM

I.5. How much would you be willing to pay for a lottery ticket, where you win FIM 100 with three out of four (75%) tickets and nothing for the fourth (25%)? _____ FIM

I.6. How much would you be willing to pay for a lottery ticket, where you win FIM 100 with one out of four (25%) tickets and nothing for three out of four (75%)? _____ FIM

I.7. You are given FIM 1000. You have to either take FIM 500 **or** a lottery ticket, where you win FIM 1000 for only every other ticket (50%) and nothing for the other ticket. Which one would you choose?
1 FIM 500
2 A lottery ticket

I.8. You are given FIM 2000. You have to either pay taxes of FIM 500 **or** take a lottery ticket, where every other ticket (50%) means FIM 1000 taxes and the other (50%) ticket releases you from paying taxes (taxes FIM 0). Which one would you choose?
1 Pay FIM 500
2 A lottery ticket

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I.9. You are choosing plants for the next growing season. You can choose from three plants and the yield is merely dependent on the forthcoming weather. The weather is not known beforehand: it can be good, average or bad. The yield of plants A,B and C varies depending on the weather in the following way:

Yield of plant A varies: **300** (good weather), **200** (average weather), **100** (bad weather).

Yield of plant B varies: **600** (good weather), **200** (average weather), **-200** (bad weather).

Yield of plant C varies: **400** (good weather), **300** (average weather), **0** (bad weather).

Which plant would you choose based on information above?

1 Plant A
2 Plant B
3 Plant C

I.10. Please explain your choice to the preceding question.

_____
_____
_____

I.11. Which plant would you choose if you receive additional information on previous weather data: it can be expected that in two cases out of ten (20%) there will be good weather, four cases out of ten average weather (40%), and four cases out of ten (40%) a bad weather?

1 Plant A
2 Plant B
3 Plant C

I.12. Would you be willing to pay for weather forecast mentioned above?

1 Yes
2 No

I.13. You are choosing forest taxation for the next 13 years. You may choose between current area-based taxation and taxation based on income from capital. You have 100 hectares of forest and you are cutting down 15 hectares over the next 13 years. Marginal incomes are expected to be unchanged.

Four different cases (A,,B,C,D) affecting the net profit that may be realised over the next 13 years. The net profit (thousands FIM) of the alternatives are:

	Net profit
A Current situation stays:	
Area-based taxation	330
Taxation based on income from capital	360
B Taxation per cent for income for capital rises considerably:	
Area based taxation	330
Taxation based on income from capital	290
C Basis for area-based taxation rises:	
Area based taxation	300
Taxation based on income from capital	360
D Price for timber and taxation per cent for income for capital rise:	
Area based taxation	540
Taxation based on income from capital	500

Which taxation form would you choose on the basis of the preceding information?
1 Area-based taxation
2 Taxation based on income from capital

I.14. Please explain your choice to the preceding question.

_____
_____
_____

J. Other questions

J.1. What kind of 'Rural risk management strategy' you would prefer?

_____
_____
_____

J.2. What kind of tools would you consider necessary for supporting risk management and decision-making?

_____
_____
_____

PLEASE TURN OVER

J.3. What kind of investments do you plan to make during the next five years?

_____
_____
_____

J.4. Should your farm be considered more as a separate entity or farm and farm family as a unity when you assess the significance of risk on the farm? Please explain your answer.

_____
_____
_____

J.5. Please give your own comments on the subject.

_____
_____
_____

THANK YOU FOR YOUR ANSWERS !

Appendix 2

Variables taken from the rural business register

Arable area of farm (hectares)

Amount of basic support received (FIM)

Main production line
- Dairy
- Beef
- Pork
- Grain
- Other crops
- Other

Location of farm (support area)
- A
- B
- C1
- C2
- C2P
- C3C4

Number and type of animals
- Dairy cow
- Beef cattle
- Pig
- Poultry
- Other

Juridical form of farm
- Family-farm
- Estate
- Agricultural concern

Type of crops produced
- Grain
- Oil seed
- Protein plant
- Grass
- Horticulture plant
- Other

Share of on-farm incomes of all incomes
- Full-time farmer
- Additional income farmer
- Part-time farmer

Age of farmer (number of years)

Appendix 3

STUDY OF FARMERS' ADJUSTMENT INTO THE EU

Instructions: Please circle the alternative you consider to be correct on questions where alternatives are given.

A. Background questions

A.1. Year of birth? Year _____

A.2. How many years ago did the shift from the previous generation on your farm take place? _____Years

A.3. What is your basic education?
1 Elementary school
2 Basic school
3 Secondary school

A.4. What is your agricultural education?
1 No agricultural education
2 Courses etc. In agriculture
3 Agricultural school
4 Agricultural collage
5 Agricultural university

A.5. When is the probable timing of the hand over to the next generation on your farm ?
1 After 0-5 years
2 After 5-15 years
3 After 15-25 years
4 Over 25 years
5 Farm quits production

A.6. Do you have a successor for the farm?
1 Yes
2 Uncertain
3 Not known

A.7. How often do you utilise a computer on the farm?
1 Regularly (at least once a week)
2 Once a week – once a month
3 Occasionally during the year
4 I don't use a computer on the farm

A.8. How you manage your bookkeeping for taxation?
1 Myself / with the family by computer
2 Myself / with the family by hand
3 Outside service used (accounting office etc.)

A.9. How much time do you spend on planning and control of production and economy during wintertime?
1 0-2 hours a week
2 2-5 hours a week
3 over 5 hours a week

PLEASE TURN OVER

A.10. Have you made a budget 1998?
1 Yes
2 No

A.11. How much is your family debt?

_____FIM

A.12. How much were your agricultural incomes in 1997 (taxation form 2, entry 21)?

_____FIM

B. Farms' adjustment into the EU:

B.1. Which of the following corresponds best to the solutions made on your farm during 1993-1997? Choose the two most important items.

	Most important (b11)	**Second most important** (b12)
Maintained current production	1	2
Expanded production	1	2
Reduced production	1	2
Changed main production line	1	2
Developed secondary occupation or additional processing	1	2
Increased off-farm incomes	1	2
Quit farming	1	2

B.2. What were the major reasons behind the preceding solutions?

_____
_____
_____

B.3. Was the decision based on economic plans, calculations and comparison of alternatives?
1 Yes
2 No

B.4. What investments have you made during 1993-1997? Choose one or more alternatives.
1 Agricultural building
2 Tractor or combine harvester
3 Other machinery
4 Dung or liquid manure cistern
5 Subsurface drainage
6 Additional land
7 Other, what? _____
8 Nothing

B.5. What is your current position on the solutions proposed below for the farm during the next five years (1998-2002)? Choose the most obvious alternative.
1 Maintain current production
2 Expand production
3 Reduce production
4 Change main production line
5 Develop secondary occupation or additional processing
6 Increase off-farm incomes
7 Quit production
8 Hand over to the next generation
9 Open solution, unable to answer

B.6. What investments do you plan to make during the next five years (1998-2002)? Choose one or more alternatives.

1 Agricultural building
2 Tractor or combine harvester
3 Other machinery
4 Dung or liquid manure cistern
5 Subsurface drainage
6 Additional land
7 Other, what? _____
8 Nothing

C. Objectives:

Objectives (criteria for decision-making) mean factors, which are important to achieve. Assess the importance of the following objectives on your farm and your family at the moment.

		Very important	**Not important**
Increasing farm size	(c1)	1 2 3 4 5 6	
Ensuring continuity	(c2)	1 2 3 4 5 6	
Improving quality of life	(c3)	1 2 3 4 5 6	
Increasing profit	(c4)	1 2 3 4 5 6	
Improving return of capital	(c5)	1 2 3 4 5 6	
Avoiding losses	(c6)	1 2 3 4 5 6	
Increasing leisure	(c7)	1 2 3 4 5 6	
Expanding production	(c8)	1 2 3 4 5 6	
Improving quality of products	(c9)	1 2 3 4 5 6	
Increasing assets	(c10)	1 2 3 4 5 6	
Ensuring liquidity	(c11)	1 2 3 4 5 6	
Taking care of the environment	(c12)	1 2 3 4 5 6	
Increasing total incomes	(c13)	1 2 3 4 5 6	
Maintaining a low degree of debt to assets	(c14)	1 2 3 4 5 6	
Increasing household spending	(c15)	1 2 3 4 5 6	
Obtaining new and bigger machinery and buildings	(c16)	1 2 3 4 5 6	
Reducing risk	(c17)	1 2 3 4 5 6	
Increasing supports	(c18)	1 2 3 4 5 6	

D. Uncertainty factors:

Economic results on a farm vary due to uncertainty. Results can be better or worse than expected. In agriculture, variation of results is affected by several factors. Assess the significance of the following uncertainty factors on your farm at the moment.

		Very significant	**No significance**
Availability and adequacy of funding	(d1)	1 2 3 4 5 6	
Production risks in plant and animal production	(d2)	1 2 3 4 5 6	
Accidents	(d3)	1 2 3 4 5 6	
Outlet of products	(d4)	1 2 3 4 5 6	
Adequacy of own knowledge, skills and education	(d5)	1 2 3 4 5 6	
Changes in agricultural policy	(d6)	1 2 3 4 5 6	
Variations in product price	(d7)	1 2 3 4 5 6	
Maintaining liquidity	(d8)	1 2 3 4 5 6	
Development and introduction of new technology	(d9)	1 2 3 4 5 6	

PLEASE TURN OVER

E. Risk management methods:

Uncertainty can be managed and reduced in several ways. Assess the importance of the following methods to manage and reduce uncertainty on your farm.

		Very Important					Not important
Planning and controlling production and economy	(e1)	1	2	3	4	5	6
Obtaining off-farm incomes	(e2)	1	2	3	4	5	6
Contract production	(e3)	1	2	3	4	5	6
Maintaining adequate liquidity and solvency	(e4)	1	2	3	4	5	6
Diversification	(e5)	1	2	3	4	5	6

F. Values:

Characteristics associated with farming are presented as follows. How they reflect your values in farming?

		Very important					Not important
Lifestyle	(f1(2))	1	2	3	4	5	6
Possibility to gain profit	(f2)	1	2	3	4	5	6
Outdoor life	(f3)	1	2	3	4	5	6
Independence of work	(f4)	1	2	3	4	5	6
Respect received from work	(f5)	1	2	3	4	5	6
Entrepreneurship	(f6)	1	2	3	4	5	6
Possibility to develop oneself	(f7)	1	2	3	4	5	6
Belonging to a farm community	(f8)	1	2	3	4	5	6
Environmentally friendly production	(f9)	1	2	3	4	5	6
Job assurance	(f10)	1	2	3	4	5	6
Challenge in work	(f11)	1	2	3	4	5	6
Continuing family farm	(f12)	1	2	3	4	5	6
Possibility to express oneself	(f13)	1	2	3	4	5	6
Possibility to expand production	(f14)	1	2	3	4	5	6
Possibility to earn reasonable incomes	(f15)	1	2	3	4	5	6
Possibility to work as one chooses	(f16)	1	2	3	4	5	6
Versatility of work	(f17)	1	2	3	4	5	6

G. Attitudes toward risk:

The following presents examples of questions aimed at testing respondents attitudes toward risk. Please circle the alternative which is the most agreeable to you. (Note that there is no 'right' answer to the questions).

G.1. Would you pay FIM 50 for a lottery ticket, where you win FIM 100 for only every other ticket (50%) and nothing for the other ticket?

1 Yes
2 No

G.2. How much would you be willing to pay for the lottery ticket above? _____ FIM

THANK YOU FOR YOUR ANSWERS!

Appendix 4

16.2.1998

STUDY OF FARMERS' ADJUSTMENT INTO THE EU

Dear recipient

You were involved in the study of risk and decision-making being carried out by the Association of Rural Advisory Centres in spring 1993. The study was conducted by Sauli Sonkkila. Your participation in the study was very valuable. The results of the study indicated which issues farmers considered important and where decision-makers should pay attention when making decisions concerning agriculture.

The operational environment of farms has been changing greatly during membership of the EU, so the questions asked in 1993 may have altered a lot during the five year period of study. Therefore, it is important to carry out a limited follow-up survey. The purpose of this study is to find out, what kind of solutions farms have reached during the membership of EU and what factors influenced these decisions.

This inquiry has been sent to different parts of Finland to all those 500 farms which responded to the 1993 survey.

We appreciate that filling in the questionnaire demands your time and energy. We are very grateful for your understanding contribution to this study. We hope that the results will lead to a better understanding of the current situation farms face and therefore assist farms to manage well in the future.

We ask you to return the form using the enclosed envelope by 2 March 1998 at the latest. You may also send this form by telefax (09-13421496).

The information received is fully confidential and will be used only for this study. The data are processed statistically and no single respondents data or opinions will be revealed.

This study is carried out by Sauli Sonkkila with the support of the Finnish Cultural Foundation, the Information Centre of the Ministry of Agriculture and Forestry and the University of Helsinki. Mr Sonkkila will provide any additional information on questions relating this study (tel. 09-13421234).

YOURS FAITHFULLY

Sauli Sonkkila	Niilo Hintikka	Matti Ylätalo
Researcher	Director General	Professor, Agric. Econ.
MMM/TIKE	MMM/TIKE	University of Helsinki

Appendix 5

Principal component analysis for objective variables

LATENT ROOTS (EIGENVALUES)

1	2	3	4	5
4.425	2.037	1.497	1.339	1.070
6	7	8	9	10
0.948	0.905	0.821	0.723	0.658
11	12	13	14	15
0.571	0.558	0.540	0.492	0.412
16	17	18		
0.393	0.327	0.285		

ROTATED LOADINGS

	C2PCA1	C2PCA2	C2PCA3	C2PCA4	C2PCA5
C1	0.810	0.004	0.162	-0.092	0.073
C2	0.529	0.211	0.271	-0.118	0.277
C3	-0.090	0.172	0.312	0.570	0.315
C4	0.159	0.136	0.818	0.152	-0.043
C5	0.148	0.233	0.756	-0.018	0.019
C6	0.124	0.650	0.132	0.076	0.070
C7	-0.197	0.120	-0.033	0.666	0.205
C8	0.806	0.030	0.221	-0.038	0.137
C9	0.391	0.001	0.105	0.201	0.586
C10	0.401	-0.030	0.508	0.392	-0.084
C11	0.020	0.482	0.176	-0.048	0.555
C12	0.018	0.044	-0.006	0.047	0.749
C13	0.173	0.032	0.774	0.141	0.107
C14	0.008	0.677	0.039	0.155	-0.112
C15	0.292	0.072	0.017	0.692	-0.184
C16	0.759	0.034	0.023	0.178	-0.081
C17	-0.011	0.693	0.100	0.030	0.213
C18	0.038	0.042	0.551	-0.086	0.119

VARIANCE EXPLAINED BY ROTATED COMPONENTS

C2PCA1	C2PCA2	C2PCA3	C2PCA4	C2PCA5
2.703	1.767	2.721	1.583	1.594

PERCENT OF TOTAL VARIANCE EXPLAINED

C2PCA1	C2PCA2	C2PCA3	C2PCA4	C2PCA5
15.018	9.819	15.118	8.793	8.854

Appendix 6

Principal component analysis for value variables

LATENT ROOTS (EIGENVALUES)

1	2	3	4	5
6.577	1.397	1.017	0.926	0.890
6	7	8	9	10
0.836	0.684	0.645	0.635	0.564
11	12	13	14	15
0.531	0.507	0.438	0.384	0.367
16	17			
0.317	0.286			

ROTATED LOADINGS

	F2PCA1	F2PCA2	F2PCA3	F2PCA4
F1(2)	0.095	0.768	-0.052	0.186
F2	0.656	-0.178	0.196	0.160
F3	-0.004	0.584	0.189	0.422
F4	0.113	0.081	0.116	0.740
F5	0.509	0.136	0.498	0.244
F6	0.365	-0.037	0.436	0.506
F7	0.160	0.010	0.520	0.552
F8	0.048	0.268	0.722	0.181
F9	0.073	0.560	0.499	-0.012
F10	0.643	0.305	0.251	0.156
F11	0.383	0.270	0.300	0.454
F12	0.487	0.330	0.332	0.108
F13	0.297	0.165	0.415	0.544
F14	0.331	-0.102	0.601	0.222
F15	0.789	0.078	-0.059	0.278
F16	0.365	0.298	0.171	0.596
F17	0.238	0.305	0.070	0.705

VARIANCE EXPLAINED BY ROTATED COMPONENTS

F2PCA1	F2PCA2	F2PCA3	F2PCA4
2.685	1.874	2.404	2.954

PERCENT OF TOTAL VARIANCE EXPLAINED

F2PCA1	F2PCA2	F2PCA3	F2PCA4
15.792	11.022	14.142	17.377

Appendix 7

Correlation between continuos variables

	A1(1)	A8(1)	A101	A111	A20	B4	B5(1)	C101	C102
A1(1)	1.000								
A8(1)	0.175	1.000							
A101	-0.213	-0.036	1.000						
A111	0.017	0.626	0.118	1.000					
A20	0.605	0.182	-0.152	0.050	1.000				
B4	-0.178	0.244	0.062	0.257	-0.264	1.000			
B5(1)	0.113	0.663	0.045	0.662	0.062	0.518	1.000		
C101	0.188	-0.091	0.207	-0.047	0.341	-0.156	-0.064	1.000	
C102	0.187	-0.000	-0.079	-0.096	0.231	-0.265	-0.173	0.243	1.000
C103	0.106	-0.020	0.066	0.141	0.093	0.058	0.096	0.041	0.141
C104	0.230	-0.071	0.128	-0.066	0.216	-0.105	-0.152	0.191	0.185
C105	-0.106	-0.114	-0.012	-0.057	-0.092	0.070	-0.176	-0.065	-0.032
C106	0.034	-0.021	-0.022	-0.107	0.048	0.106	-0.043	0.048	0.193
C107	-0.022	-0.059	-0.012	-0.056	0.006	-0.051	-0.139	0.058	0.020
C108	-0.162	-0.182	0.453	0.026	-0.308	-0.006	-0.225	-0.052	-0.037
C109	0.004	0.131	0.252	0.101	0.043	0.133	0.087	0.282	0.075
C110	0.068	0.089	-0.009	-0.121	0.108	-0.078	-0.122	0.397	0.311
C111	0.096	-0.061	-0.070	0.195	-0.015	-0.024	-0.112	-0.040	0.160
C112	0.051	0.107	0.058	-0.018	0.094	-0.075	-0.055	0.174	0.330
C113	0.174	0.118	-0.114	0.094	0.203	-0.094	0.033	0.110	0.164
C114	0.098	-0.048	-0.052	0.063	0.053	-0.278	-0.179	0.043	0.234
C115	-0.136	0.002	0.176	0.109	-0.043	-0.037	0.057	0.055	0.154
C116	0.028	-0.012	-0.063	0.029	0.035	-0.045	-0.201	0.098	0.048
C117	0.129	-0.005	-0.116	0.047	0.015	-0.359	-0.142	-0.132	0.093
C118	0.209	0.049	-0.145	0.084	0.017	-0.088	0.017	0.146	0.336
C119	0.079	-0.031	-0.169	0.036	0.087	-0.172	-0.186	0.121	0.193
C120	-0.049	0.104	0.053	0.150	-0.053	0.153	-0.051	0.110	0.106
H1	0.346	-0.206	-0.087	-0.242	0.093	-0.279	-0.237	0.014	0.273
H2	0.036	-0.212	-0.035	-0.158	0.081	-0.260	-0.337	0.165	0.283
H3	-0.055	-0.058	-0.149	0.002	0.017	-0.106	0.094	-0.014	0.065
H4	0.074	-0.193	-0.073	-0.015	0.066	-0.167	-0.081	0.017	0.061
H5	0.207	-0.118	-0.139	-0.081	0.024	-0.261	-0.187	0.219	0.246
H6	0.344	0.023	-0.103	0.137	0.019	0.030	0.080	-0.035	0.040
H7	0.154	-0.112	-0.030	-0.092	-0.041	-0.085	-0.089	0.065	0.160
H8	0.244	0.021	0.008	0.075	-0.057	-0.018	-0.009	0.048	0.078
H9	0.067	0.030	-0.120	-0.006	0.178	-0.047	-0.150	0.063	0.222
H10	0.027	-0.036	-0.174	-0.105	-0.014	-0.113	-0.181	-0.062	0.037
H11	0.048	-0.113	-0.169	-0.107	0.141	-0.290	-0.158	0.108	0.335
H12	0.161	-0.142	-0.042	-0.062	-0.020	-0.170	-0.220	-0.011	0.144
H13	-0.042	-0.175	-0.103	0.036	-0.154	-0.120	-0.238	-0.115	0.227
H14	-0.177	-0.122	-0.111	0.085	-0.218	0.152	-0.068	-0.010	0.103
H15	0.256	-0.007	-0.089	0.038	0.156	-0.239	-0.120	0.194	0.427
H16	0.067	-0.165	-0.108	-0.123	0.110	-0.286	-0.214	0.124	0.188
H17	0.082	0.003	-0.157	-0.013	0.107	-0.147	-0.203	0.237	0.443
H18	0.134	-0.298	-0.140	-0.121	-0.054	-0.214	-0.375	0.028	0.183
H19	0.086	-0.276	0.005	0.029	-0.027	-0.052	-0.288	0.055	0.186
H20	-0.097	-0.142	0.047	0.018	-0.129	-0.003	-0.067	0.051	0.083
H21	0.097	-0.221	0.067	-0.190	-0.158	-0.175	-0.257	0.165	0.277
H22	-0.061	-0.126	0.000	0.022	-0.076	-0.146	-0.183	0.070	0.213
H23	-0.068	-0.008	-0.113	-0.016	-0.057	-0.131	0.007	-0.027	0.276
I4	-0.080	0.010	-0.265	0.008	-0.019	-0.092	-0.166	0.019	-0.049
A1(2)	-0.706	-0.305	0.238	0.199	-0.466	0.114	-0.229	-0.129	-0.098
A2(2)	0.502	0.181	-0.213	0.134	0.633	-0.101	0.122	0.199	0.113
A11	-0.210	0.327	0.076	0.274	-0.242	0.746	0.404	-0.116	-0.028
A12(2)	-0.033	0.603	0.112	0.629	-0.136	0.461	0.701	-0.094	-0.005
C1	0.056	0.188	0.147	0.099	0.028	0.080	0.033	0.390	0.214
C2	0.258	0.186	-0.119	0.169	0.222	-0.100	-0.007	0.165	0.429
C3	-0.150	0.106	-0.117	0.132	-0.078	-0.001	0.015	-0.085	-0.185
C4	0.025	0.026	-0.060	-0.040	0.042	0.169	-0.134	0.115	0.093
C5	-0.034	0.005	-0.142	-0.012	0.033	0.167	-0.076	0.144	-0.030
C6	0.052	0.036	-0.051	0.051	-0.085	0.082	-0.041	-0.075	0.122
C7	-0.107	-0.045	0.342	0.055	0.022	-0.282	-0.232	0.053	0.167
C8	0.034	0.251	0.145	0.158	0.022	0.216	0.067	0.200	0.145
C9	0.091	0.236	0.226	0.260	0.076	0.086	0.051	0.285	0.072
C10	0.002	-0.020	0.173	-0.169	-0.015	-0.095	-0.285	0.157	0.158
C11	-0.068	0.061	-0.068	0.077	-0.179	0.172	0.060	-0.028	0.108
C12	0.171	0.012	-0.126	0.132	0.060	-0.044	-0.067	0.203	0.161
C13	0.056	-0.013	-0.137	-0.112	0.020	-0.018	-0.236	0.178	0.110
C14	0.004	-0.168	-0.095	-0.186	-0.069	0.004	-0.164	-0.015	-0.174
C15	0.071	0.181	-0.053	0.024	0.071	-0.011	0.036	-0.114	0.250
C16	0.091	0.180	-0.098	0.057	0.101	0.098	-0.006	0.147	-0.096
C17	0.021	0.001	0.006	-0.156	0.042	-0.032	-0.154	-0.071	0.010
C18	0.280	0.167	-0.126	0.040	0.262	-0.105	-0.103	0.126	0.142
D1	0.061	0.121	-0.141	-0.027	0.094	-0.005	-0.205	0.195	0.200
D2	0.229	0.084	-0.134	0.074	0.264	0.034	-0.001	-0.183	0.120
D3	0.112	-0.051	-0.121	-0.027	0.206	-0.153	-0.112	-0.132	0.254
D4	0.414	0.037	-0.107	-0.036	0.284	-0.069	0.025	0.192	0.243
D5	0.210	-0.044	0.119	0.095	0.070	0.079	-0.046	0.119	-0.149
D6	0.199	0.146	-0.078	0.229	0.110	-0.036	0.178	-0.069	0.057
D7	0.323	0.088	-0.088	0.162	0.239	-0.015	0.056	-0.064	0.295
D8	0.129	-0.101	-0.076	-0.050	0.090	-0.009	-0.035	0.044	0.034
D9	0.156	0.123	-0.195	0.052	0.050	0.070	-0.024	0.098	-0.078
E1	0.215	0.133	-0.079	0.216	-0.131	0.036	0.171	-0.058	0.108
E2	0.083	-0.053	0.205	-0.167	-0.010	-0.131	-0.263	-0.053	0.086
E3	0.145	0.170	-0.009	0.247	0.125	0.091	0.163	0.134	0.189
E4	0.162	0.001	-0.083	0.164	0.091	0.037	0.108	0.093	0.157
E5	0.218	-0.147	-0.221	-0.303	0.081	-0.063	-0.251	0.013	0.180
F1(2)	0.178	0.071	-0.125	-0.032	0.352	-0.121	0.010	0.107	0.243
F2	0.025	0.181	0.058	0.117	0.128	0.011	-0.063	0.065	0.254
F3	-0.004	0.020	0.351	-0.114	0.010	-0.161	-0.056	-0.066	-0.016
F4	0.109	-0.109	-0.103	-0.084	0.080	-0.259	-0.181	0.030	0.148
F5	0.194	0.045	-0.158	0.055	-0.040	0.012	-0.140	-0.080	0.125
F6	0.037	0.105	-0.132	0.125	-0.113	-0.008	-0.077	0.010	0.067
F7	0.174	0.023	-0.167	-0.059	-0.028	-0.050	-0.109	-0.013	0.042
F8	0.289	0.051	-0.186	0.001	0.155	0.024	-0.054	0.004	0.197
F9	0.234	-0.111	-0.162	-0.106	0.229	-0.153	-0.182	0.100	0.238
F10	0.278	0.003	-0.104	0.115	0.216	-0.170	-0.062	-0.010	0.277
F11	0.211	0.166	0.176	0.217	0.129	-0.138	0.088	0.167	0.342
F12	0.336	0.167	-0.122	0.077	0.123	-0.218	-0.106	0.101	0.382
F13	0.167	0.052	-0.142	-0.003	0.009	-0.153	-0.054	0.111	0.263
F14	0.244	0.276	-0.169	0.168	0.109	0.093	0.064	0.152	0.108
F15	0.061	-0.032	-0.109	-0.000	0.008	-0.001	-0.026	-0.184	0.113
F16	0.205	0.032	-0.105	-0.115	0.013	-0.130	-0.102	0.004	0.163
F17	0.009	0.009	-0.120	-0.089	0.127	-0.016	-0.018	0.008	0.150
G2	-0.092	0.114	0.074	0.178	-0.036	0.016	0.068	0.089	-0.131
VILJELYA	0.051	0.778	-0.038	0.536	0.028	0.270	0.557	0.079	0.112
IKA97	0.706	0.305	-0.238	0.199	0.466	-0.114	0.229	0.129	0.098
C2PCA1	0.130	0.268	0.097	0.142	0.092	0.126	0.070	0.277	0.194
C2PCA2	-0.010	-0.091	-0.132	-0.139	-0.104	0.074	-0.092	-0.170	-0.051
C2PCA3	0.049	-0.011	-0.146	-0.085	0.071	0.044	-0.195	0.141	0.071
C2PCA4	-0.109	0.049	0.160	0.012	-0.019	-0.161	-0.134	-0.075	0.033
C2PCA5	0.081	0.185	0.075	0.295	0.025	0.001	0.081	0.228	0.184
LYPSYL97	-0.036	0.602	0.145	0.809	-0.011	0.277	0.559	0.056	-0.024
LIHAK97	-0.089	0.481	0.015	0.416	-0.107	0.197	0.403	-0.057	-0.050
FPCA1	0.167	0.140	-0.128	0.184	0.118	-0.043	-0.029	-0.030	0.318
FPCA2	0.213	-0.080	0.075	-0.138	0.315	-0.249	-0.066	0.037	0.251
FPCA3	0.267	0.120	-0.177	0.082	0.053	0.032	-0.064	0.105	0.124
FPCA4	-0.094	-0.039	0.033	-0.111	-0.113	-0.085	-0.034	-0.019	-0.051

	C103	C104	C105	C106	C107	C108	C109	C110	C111
C103	1.000								
C104	0.173	1.000							
C105	0.252	0.473	1.000						
C106	-0.019	0.207	0.137	1.000					
C107	0.213	0.367	0.604	0.041	1.000				
C108	0.072	0.224	0.353	-0.015	0.342	1.000			
C109	0.337	0.203	0.229	0.047	0.118	0.118	1.000		
C110	0.003	0.074	0.036	0.233	0.026	-0.111	0.242	1.000	
C111	0.122	0.017	0.225	0.186	0.305	0.439	-0.042	0.012	1.000
C112	0.248	0.367	0.346	0.028	0.242	0.162	0.207	0.194	0.068
C113	0.106	0.133	0.132	0.236	0.166	0.060	0.296	0.075	0.299
C114	0.000	0.202	0.152	0.102	0.335	0.371	-0.046	0.086	0.522
C115	0.109	0.007	0.086	0.394	0.244	0.228	-0.006	-0.053	0.465
C116	0.216	0.474	0.682	0.183	0.542	0.298	0.248	0.140	0.271
C117	0.142	0.319	0.202	0.026	0.306	0.327	-0.070	-0.109	0.330
C118	0.099	0.180	0.074	0.094	0.102	-0.153	0.168	0.124	0.135
C119	0.238	0.146	0.169	0.097	0.118	0.004	0.358	0.292	0.263
C120	0.062	0.298	0.267	0.042	0.305	0.336	0.314	0.225	0.354
H1	-0.024	0.114	-0.074	0.335	-0.031	-0.006	-0.084	0.043	0.069
H2	0.047	0.248	0.400	-0.011	0.186	0.220	0.134	0.047	0.179
H3	0.084	0.101	0.049	0.104	-0.080	0.057	-0.106	-0.092	-0.004
H4	-0.038	0.069	0.117	0.067	0.011	0.136	-0.101	-0.101	0.212
H5	-0.141	0.025	-0.065	0.102	-0.069	0.057	0.055	-0.015	0.167
H6	0.148	0.045	-0.010	0.023	0.025	0.170	-0.025	-0.211	0.182
H7	-0.050	-0.020	-0.046	0.102	-0.075	0.024	-0.112	-0.045	0.073
H8	-0.065	-0.059	-0.077	0.117	-0.105	-0.001	-0.158	0.044	0.064
H9	-0.013	0.037	0.135	0.211	0.060	-0.082	0.033	0.154	0.201
H10	-0.071	-0.048	-0.019	0.262	-0.029	-0.215	-0.085	0.034	0.009
H11	0.011	0.121	-0.088	0.151	-0.008	-0.065	-0.002	0.174	0.142
H12	-0.067	0.098	-0.008	0.331	0.159	0.078	-0.096	0.016	0.368
H13	-0.161	0.104	-0.000	0.139	0.091	0.211	-0.135	0.039	0.257
H14	0.015	0.150	0.227	0.349	0.132	0.050	-0.043	0.210	0.241
H15	0.068	0.227	0.130	0.231	0.113	0.078	0.104	0.208	0.219
H16	0.092	0.200	0.112	0.153	0.187	0.087	-0.010	0.069	0.265
H17	0.004	0.312	0.189	0.317	0.166	-0.055	0.161	0.483	0.024
H18	0.010	0.333	0.105	0.246	0.126	0.116	-0.213	0.029	0.147
H19	0.114	0.301	0.182	0.211	0.142	0.217	0.033	0.088	0.260
H20	0.014	0.052	0.082	0.436	0.025	0.184	-0.112	-0.046	0.175
H21	0.007	0.248	-0.036	0.152	0.122	-0.048	0.050	0.162	-0.053
H22	-0.047	0.361	0.060	0.238	0.250	0.172	0.107	0.152	0.275
H23	-0.024	0.290	0.143	0.340	0.163	0.050	0.016	0.159	0.161
I4	-0.137	-0.084	0.066	0.058	-0.002	-0.159	-0.054	0.010	0.026
A1(2)	-0.068	-0.070	0.250	-0.004	0.196	0.262	0.086	0.085	0.000
A2(2)	0.024	0.040	-0.286	0.028	-0.230	-0.407	-0.102	-0.091	-0.028
A11	0.022	-0.145	0.069	0.161	-0.021	0.081	0.059	0.128	0.115
A12(2)	0.027	-0.146	-0.016	-0.056	0.044	0.052	0.065	-0.045	0.148
C1	-0.011	0.089	-0.080	0.088	0.145	-0.011	0.160	0.337	-0.093
C2	-0.016	0.213	0.057	0.128	0.172	-0.042	0.052	0.145	0.138
C3	0.083	-0.177	0.045	-0.079	-0.081	0.013	0.144	0.005	0.050
C4	-0.066	0.085	0.254	0.043	0.167	0.236	0.286	0.188	0.232
C5	-0.010	-0.082	0.136	-0.067	0.174	0.121	0.243	0.207	0.210
C6	0.097	0.030	0.150	-0.021	0.180	0.315	0.040	0.013	0.216
C7	-0.032	0.120	0.257	-0.096	0.098	0.429	0.220	-0.019	0.244
C8	-0.031	0.049	-0.036	0.136	0.144	0.053	0.071	0.447	0.001
C9	-0.008	0.211	0.123	0.129	0.200	0.230	0.227	0.264	0.283
C10	0.073	0.077	0.155	-0.046	0.170	0.136	0.343	0.237	0.067
C11	-0.002	0.078	0.070	0.377	0.102	0.088	0.096	0.149	0.091
C12	0.057	-0.011	-0.094	0.176	0.044	0.026	-0.072	0.116	0.275
C13	-0.119	0.059	0.116	0.244	0.080	0.098	0.279	0.318	0.188
C14	0.020	-0.116	0.045	-0.116	0.240	0.102	-0.030	-0.117	-0.031
C15	0.093	-0.105	0.089	-0.085	0.140	-0.068	0.061	0.149	0.228
C16	-0.124	0.113	0.149	0.084	0.373	0.031	0.032	0.223	0.260
C17	0.138	0.018	0.104	-0.019	0.074	0.118	0.099	-0.067	-0.053
C18	0.103	0.333	0.085	0.010	0.171	-0.006	0.235	0.107	0.026
D1	-0.205	0.190	0.173	0.244	0.150	0.061	0.101	0.406	0.241
D2	-0.003	0.121	0.029	0.081	-0.007	-0.097	-0.008	-0.121	-0.016
D3	0.147	-0.005	-0.021	0.326	-0.075	-0.072	0.149	0.042	0.115
D4	-0.032	0.229	-0.113	0.325	-0.060	-0.068	0.106	0.252	0.003
D5	-0.000	0.071	0.094	0.038	0.051	0.086	0.122	0.118	0.102
D6	0.094	0.101	-0.005	0.049	0.089	0.102	0.060	-0.151	-0.016
D7	0.126	0.062	0.035	0.224	0.008	-0.005	0.125	-0.030	0.107
D8	-0.031	0.124	0.038	0.562	-0.000	0.100	0.004	0.121	0.044
D9	-0.022	-0.183	-0.027	-0.018	0.051	-0.149	0.127	0.159	0.173
E1	-0.128	-0.186	-0.202	0.063	-0.207	-0.135	0.003	0.033	0.063
E2	0.016	0.074	0.119	0.174	0.019	0.174	0.138	-0.038	0.161
E3	-0.024	0.125	-0.152	0.182	-0.200	-0.155	0.072	0.219	0.046
E4	0.152	0.089	0.068	0.014	0.128	0.213	-0.088	-0.111	0.200
E5	0.009	0.039	0.131	0.265	0.079	-0.111	0.003	0.311	0.148
F1(2)	0.074	0.198	0.074	0.037	-0.054	-0.013	0.067	0.001	-0.031
F2	-0.039	0.316	0.321	0.205	0.127	0.193	0.291	0.159	0.260
F3	-0.125	0.268	0.159	0.329	-0.006	0.156	-0.026	-0.141	-0.146
F4	-0.237	0.133	0.067	0.395	0.024	0.099	-0.134	0.053	0.072
F5	-0.174	0.216	0.054	0.336	0.025	0.119	-0.156	-0.002	0.305
F6	-0.105	-0.019	0.075	0.266	-0.105	0.041	-0.008	0.123	0.183
F7	-0.209	-0.061	-0.175	0.014	-0.250	-0.107	-0.078	-0.007	-0.020
F8	-0.071	0.140	-0.031	0.112	-0.025	-0.045	-0.077	-0.024	-0.003
F9	0.055	0.145	-0.200	0.004	-0.022	-0.167	-0.058	0.039	0.020
F10	-0.076	0.226	-0.089	-0.090	-0.027	0.034	-0.159	-0.144	0.088
F11	0.008	0.150	-0.131	0.036	0.009	-0.054	-0.093	0.019	-0.068
F12	-0.033	0.240	0.089	0.195	0.093	0.016	-0.083	0.092	0.131
F13	-0.054	-0.065	-0.088	0.208	-0.100	-0.111	-0.041	0.070	0.064
F14	-0.183	0.118	-0.069	0.176	-0.045	-0.157	-0.084	0.273	-0.011
F15	-0.137	0.039	-0.006	0.291	-0.007	0.169	-0.097	-0.013	0.248
F16	-0.076	0.174	0.008	0.447	-0.105	-0.052	-0.170	0.110	-0.060
F17	-0.001	0.141	0.095	0.480	-0.137	-0.098	-0.108	0.023	-0.056
G2	-0.021	-0.012	-0.034	-0.161	-0.073	-0.145	0.054	-0.028	-0.244
VILJELYA	0.036	0.086	0.057	0.018	0.076	-0.154	0.128	0.282	-0.044
IKA97	0.068	0.070	-0.250	0.004	-0.196	-0.262	-0.086	-0.085	-0.000
C2PCA1	-0.046	0.117	-0.000	0.106	0.280	-0.015	0.055	0.377	0.084
C2PCA2	0.098	-0.079	0.109	-0.026	0.219	0.172	-0.046	-0.155	-0.010
C2PCA3	-0.025	0.090	0.159	0.056	0.067	0.102	0.351	0.216	0.126
C2PCA4	0.047	-0.103	0.203	-0.180	0.095	0.188	0.186	0.044	0.273
C2PCA5	0.017	0.188	-0.030	0.344	-0.025	0.113	0.088	0.191	0.217
LYPSYL97	0.188	-0.071	0.037	-0.108	0.058	-0.022	0.251	0.031	0.067
LIHAK97	0.062	-0.126	0.037	-0.127	0.026	-0.026	-0.052	0.070	0.023
FPCA1	-0.048	0.257	0.137	0.157	0.118	0.189	0.039	0.067	0.346
FPCA2	0.133	0.271	-0.033	0.019	0.015	-0.024	-0.089	-0.172	-0.136
FPCA3	-0.098	0.051	-0.136	-0.027	-0.045	-0.149	-0.043	0.103	0.025
FPCA4	-0.146	-0.063	0.048	0.418	-0.162	-0.007	-0.101	0.032	-0.104

	C112	C113	C114	C115	C116	C117	C118	C119	C120
C112	1.000								
C113	-0.059	1.000							
C114	-0.037	0.249	1.000						
C115	0.041	0.298	0.343	1.000					
C116	0.499	0.261	0.181	0.148	1.000				
C117	0.093	0.256	0.452	0.110	0.327	1.000			
C118	0.362	0.011	-0.066	0.061	0.120	-0.159	1.000		
C119	0.255	0.234	0.044	0.002	0.318	-0.012	0.374	1.000	
C120	0.353	0.157	0.168	0.070	0.374	0.101	0.207	0.401	1.000
H1	-0.198	0.133	0.111	0.073	0.027	0.143	0.107	0.166	0.028
H2	0.305	0.201	0.136	-0.051	0.260	0.198	0.244	0.157	0.309
H3	-0.105	-0.070	0.138	0.038	-0.049	0.175	-0.119	-0.055	-0.101
H4	0.120	-0.012	0.302	0.110	0.113	0.221	0.142	-0.095	-0.064
H5	0.021	0.428	0.087	0.124	0.118	0.089	0.152	0.192	0.030
H6	-0.032	0.101	0.240	-0.012	0.084	0.167	0.060	-0.020	0.012

H7	-0.017	0.202	0.163	-0.101	-0.031	0.121	-0.013	0.045	-0.002
H8	-0.057	0.189	0.148	-0.043	-0.032	-0.027	0.025	0.065	0.008
H9	0.182	0.408	0.190	0.167	0.083	0.076	0.043	0.112	0.114
H10	-0.023	0.244	0.023	0.018	0.030	-0.006	0.131	0.050	-0.062
H11	0.137	0.293	0.218	0.268	0.088	-0.007	0.244	0.280	0.174
H12	-0.195	0.342	0.218	0.325	0.081	0.178	0.115	0.157	0.118
H13	-0.125	0.063	0.327	0.164	0.107	0.201	0.132	-0.008	0.169
H14	0.066	0.303	0.222	0.184	0.318	0.012	0.104	0.125	0.172
H15	0.116	0.489	0.346	0.284	0.343	0.207	0.221	0.365	0.145
H16	0.125	0.248	0.409	0.132	0.200	0.302	0.092	0.143	0.126
H17	0.228	0.342	0.251	0.064	0.353	0.173	0.171	0.366	0.326
H18	-0.024	0.106	0.231	0.127	0.289	0.124	0.124	0.233	-0.032
H19	0.070	0.167	0.360	0.167	0.242	0.190	0.139	0.092	0.217
H20	0.037	0.207	0.183	0.307	0.101	0.022	0.114	0.026	-0.017
H21	-0.127	0.141	0.071	0.025	0.047	-0.078	0.180	0.102	0.094
H22	0.072	0.252	0.314	0.201	0.241	0.246	0.183	0.260	0.373
H23	0.100	0.291	0.442	0.326	0.165	0.211	0.217	0.257	0.165
I4	-0.117	0.075	0.033	0.082	0.078	-0.180	0.124	0.139	-0.069
A1(2)	0.118	-0.094	-0.027	0.133	0.131	-0.023	-0.210	0.009	0.103
A2(2)	-0.060	0.108	-0.034	-0.229	-0.199	-0.139	0.184	0.044	-0.044
A11	0.086	-0.126	-0.042	0.072	0.033	-0.164	-0.037	0.017	0.269
A12(2)	0.125	0.034	-0.076	0.233	0.035	-0.015	0.100	-0.097	0.110
C1	0.207	-0.044	0.061	0.052	0.152	-0.082	0.074	0.149	0.218
C2	0.020	0.222	0.238	0.095	0.178	0.167	0.106	0.128	0.236
C3	-0.118	0.046	0.174	-0.008	-0.020	0.151	-0.151	0.138	0.000
C4	0.189	0.219	0.142	-0.001	0.220	0.037	-0.012	0.112	0.317
C5	0.007	0.182	0.182	0.007	0.145	-0.017	-0.092	0.137	0.322
C6	0.033	0.148	0.354	0.190	0.202	0.244	-0.066	-0.039	0.129
C7	0.168	0.123	0.374	0.124	0.135	0.166	-0.153	-0.038	0.082
C8	-0.039	-0.084	0.126	0.064	0.114	-0.103	-0.059	0.151	0.262
C9	-0.055	0.219	0.190	0.226	0.121	0.031	0.050	0.249	0.431
C10	0.322	0.083	0.068	-0.038	0.265	0.063	0.050	0.186	0.236
C11	-0.139	0.052	0.174	0.161	0.145	0.138	0.067	0.079	0.054
C12	-0.088	0.030	0.186	0.216	0.170	0.184	0.016	0.098	0.091
C13	0.095	0.309	0.297	0.104	0.316	0.066	-0.010	0.184	0.227
C14	-0.147	-0.084	0.062	-0.072	0.045	-0.034	-0.048	-0.108	-0.096
C15	0.120	0.191	0.138	0.161	0.004	0.074	0.258	0.075	0.069
C16	-0.029	0.176	0.159	0.093	0.289	0.115	0.091	0.224	0.314
C17	0.027	0.039	0.165	-0.087	0.051	0.117	-0.201	-0.130	0.186
C18	0.198	0.251	0.235	-0.049	0.346	0.217	0.103	0.161	0.330
D1	0.125	0.185	0.296	0.099	0.218	0.113	0.203	0.280	0.363
D2	-0.043	0.196	0.281	-0.084	0.101	0.157	-0.169	-0.130	0.050
D3	-0.044	0.128	0.213	0.049	0.010	0.117	-0.022	0.056	-0.102
D4	-0.047	0.080	0.060	0.060	-0.027	-0.126	0.221	0.160	0.042
D5	-0.233	0.088	0.069	-0.070	0.015	0.010	-0.030	0.008	-0.012
D6	-0.097	0.210	0.348	0.204	0.044	0.176	-0.145	-0.012	-0.077
D7	-0.102	0.285	0.320	0.165	0.003	0.078	0.030	0.097	0.028
D8	-0.174	0.056	0.147	0.103	0.054	0.105	-0.014	0.073	-0.019
D9	-0.191	0.246	-0.022	-0.040	-0.007	-0.023	0.118	0.279	0.135
E1	-0.350	0.189	0.057	0.053	-0.182	-0.173	0.222	0.076	-0.045
E2	0.163	0.099	0.090	0.077	0.151	0.038	0.185	0.249	0.159
E3	-0.104	0.161	-0.001	0.094	-0.081	-0.246	0.156	0.145	-0.073
E4	-0.014	0.058	0.301	0.083	0.112	0.144	0.021	-0.190	0.026
E5	-0.021	0.148	0.113	0.063	0.059	-0.180	0.162	0.293	0.078
F1(2)	0.127	0.063	0.093	0.029	0.220	0.064	0.007	-0.019	0.014
F2	0.339	0.276	0.124	0.019	0.343	0.323	0.204	0.278	0.369
F3	0.083	-0.094	-0.011	0.145	0.122	-0.052	-0.008	-0.032	-0.031
F4	0.045	-0.060	0.243	0.098	0.104	0.102	0.182	-0.104	0.089
F5	0.017	0.272	0.227	0.139	0.302	0.147	0.176	0.284	0.223
F6	-0.033	0.094	0.177	0.030	0.196	0.019	0.122	0.267	0.136
F7	-0.108	-0.134	0.020	-0.189	-0.072	-0.018	0.097	0.065	0.024
F8	-0.091	0.088	0.059	-0.030	0.087	-0.158	0.190	0.255	0.039
F9	-0.218	0.145	0.095	0.102	-0.051	0.033	0.159	0.066	-0.045
F10	0.020	-0.025	0.174	0.007	0.032	0.109	0.147	0.043	-0.210
F11	-0.151	0.135	0.145	0.047	-0.043	0.060	0.122	0.008	0.122
F12	0.118	0.275	0.221	0.054	0.333	0.200	0.311	0.244	0.147
F13	-0.123	0.135	0.162	-0.074	0.063	0.182	0.136	-0.024	-0.030
F14	-0.031	0.024	0.055	-0.042	0.154	-0.019	0.108	0.182	0.221
F15	-0.036	0.141	0.050	0.135	0.121	0.219	-0.063	0.086	0.252
F16	-0.067	-0.028	0.035	-0.043	0.124	0.049	0.157	0.060	-0.017
F17	-0.035	0.071	-0.055	0.146	0.218	0.051	0.103	-0.067	-0.142
G2	0.062	-0.144	-0.148	-0.064	-0.069	-0.163	-0.002	-0.004	-0.003
VILJELYA	0.194	0.161	-0.086	0.014	0.138	0.046	0.158	0.129	0.170
IKA97	-0.118	0.094	0.027	-0.133	-0.131	0.023	0.210	-0.009	-0.103
C2PCA1	0.059	0.037	0.092	0.115	0.176	-0.034	0.129	0.201	0.303
C2PCA2	-0.133	-0.026	0.198	-0.015	0.059	0.120	-0.120	-0.196	-0.023
C2PCA3	0.186	0.263	0.178	-0.050	0.273	0.061	-0.034	0.176	0.299
C2PCA4	0.124	0.149	0.212	0.121	0.036	0.127	0.026	0.088	0.040
C2PCA5	-0.161	0.107	0.248	0.264	0.124	0.186	-0.022	0.193	0.219
LYPSYL97	0.007	0.175	0.018	0.106	0.079	-0.025	0.027	0.041	0.265
LIHAK97	0.133	0.097	0.005	0.154	0.015	-0.038	0.072	0.006	-0.011
FPCA1	0.193	0.309	0.188	0.097	0.310	0.374	0.140	0.250	0.425
FPCA2	-0.033	0.056	0.046	0.150	0.063	-0.006	0.044	-0.090	-0.142
FPCA3	-0.129	0.085	0.099	-0.078	0.028	-0.101	0.193	0.260	0.080
FPCA4	-0.057	-0.167	-0.005	-0.006	0.013	-0.016	0.003	-0.176	-0.128

	H1	**H2**	**H3**	**H4**	**H5**	**H6**	**H7**	**H8**	**H9**
H1	1.000								
H2	0.210	1.000							
H3	0.088	0.131	1.000						
H4	0.072	0.229	0.296	1.000					
H5	0.303	0.237	-0.066	0.191	1.000				
H6	0.223	-0.082	0.007	0.334	0.294	1.000			
H7	0.399	0.222	0.081	0.328	0.288	0.389	1.000		
H8	0.328	0.216	-0.023	0.175	0.260	0.432	0.741	1.000	
H9	0.019	0.267	-0.074	0.175	0.251	0.081	0.462	0.420	1.000
H10	0.321	0.143	-0.086	0.067	0.279	0.125	0.456	0.362	0.372
H11	0.218	0.304	0.122	0.182	0.385	0.017	0.178	0.155	0.305
H12	0.577	0.173	0.023	0.039	0.385	0.146	0.296	0.360	0.222
H13	0.295	0.278	0.153	0.261	0.270	0.059	-0.000	-0.013	-0.038
H14	0.057	0.161	-0.044	0.215	0.208	0.222	0.213	0.332	0.428
H15	0.332	0.251	0.114	0.091	0.337	0.063	0.147	0.187	0.140
H16	0.256	0.377	0.126	0.442	0.245	0.283	0.412	0.338	0.322
H17	0.221	0.257	-0.019	0.053	0.256	-0.028	0.119	0.237	0.421
H18	0.468	0.182	0.123	0.183	0.399	0.182	0.223	0.256	0.166
H19	0.352	0.414	0.069	0.160	0.251	0.240	0.175	0.201	0.306
H20	0.184	0.199	0.233	0.482	0.310	0.173	0.297	0.267	0.293
H21	0.454	0.195	0.001	-0.235	0.326	0.025	0.038	0.174	-0.085
H22	0.180	0.245	0.043	0.192	0.161	0.029	0.151	0.189	0.264
H23	0.200	0.182	0.171	0.244	0.154	0.066	0.176	0.202	0.281
I4	-0.107	-0.096	-0.081	0.001	0.148	-0.133	-0.177	-0.049	0.068
A1(2)	-0.229	0.036	0.037	0.024	-0.137	-0.204	-0.158	-0.138	-0.015
A2(2)	0.151	-0.004	-0.085	-0.096	0.023	0.067	0.208	0.147	0.111
A11	-0.216	-0.194	-0.068	-0.206	-0.298	-0.013	-0.109	-0.032	0.086
A12(2)	-0.317	-0.195	0.025	-0.079	-0.072	0.040	-0.148	-0.020	-0.002
C1	-0.002	-0.181	-0.182	-0.137	0.155	0.178	0.139	0.232	0.153
C2	0.204	0.101	0.065	-0.066	0.311	0.172	0.014	0.075	0.096
C3	0.112	0.090	0.069	0.109	0.066	-0.020	0.168	0.048	0.182
C4	0.021	0.187	-0.095	-0.032	0.198	0.103	0.115	0.071	0.344
C5	-0.114	0.087	-0.100	-0.123	0.110	0.078	-0.014	0.013	0.276
C6	0.194	0.147	0.067	0.156	0.269	0.171	0.084	0.064	0.145
C7	-0.022	0.231	-0.005	0.160	0.025	-0.120	0.029	-0.064	0.102
C8	0.160	-0.204	-0.123	-0.210	-0.038	0.087	0.068	0.232	0.082
C9	0.136	0.028	-0.163	-0.143	0.184	-0.015	0.085	0.208	0.152
C10	0.143	0.090	-0.276	-0.149	0.168	0.021	0.180	0.081	0.215
C11	0.314	-0.025	0.173	0.015	0.068	0.122	0.037	0.042	-0.044
C12	0.414	0.075	0.101	0.105	0.334	0.114	0.140	0.114	0.151
C13	0.215	0.064	-0.163	-0.034	0.287	0.121	0.048	0.086	0.275
C14	0.167	0.135	0.084	0.018	-0.008	0.042	0.197	0.130	-0.086
C15	0.055	0.021	-0.181	0.017	0.006	0.011	0.019	0.033	0.147

C16	0.079	-0.112	-0.002	-0.019	0.171	0.121	0.018	0.020	0.218
C17	0.262	0.112	-0.023	-0.023	0.049	0.031	0.081	0.010	0.153
C18	-0.044	0.170	0.011	-0.040	0.204	0.172	-0.015	0.090	0.166
D1	0.152	0.154	-0.023	0.080	0.198	0.100	0.038	0.046	0.284
D2	0.123	0.141	-0.011	0.125	0.072	0.104	0.124	0.134	0.223
D3	0.337	0.050	0.063	0.064	0.026	0.037	0.010	-0.070	0.069
D4	0.304	-0.039	0.061	-0.018	0.209	0.040	-0.015	0.067	-0.008
D5	0.332	-0.007	-0.193	0.090	0.121	0.122	0.180	0.193	0.067
D6	0.016	0.026	0.140	0.128	0.203	0.066	0.085	0.114	0.141
D7	0.345	0.130	-0.034	0.115	0.278	0.203	0.062	0.116	0.199
D8	0.340	0.016	0.233	-0.001	0.059	0.023	-0.007	-0.013	0.088
D9	0.202	-0.091	-0.195	0.018	0.275	0.192	0.147	0.134	0.174
E1	0.306	-0.080	-0.028	0.021	0.239	0.195	0.146	0.305	0.040
E2	0.283	0.177	0.021	0.252	0.250	0.221	0.256	0.186	0.233
E3	0.115	-0.103	0.071	-0.010	0.165	-0.150	-0.083	0.078	0.102
E4	0.101	0.153	0.114	0.046	0.138	0.233	0.019	0.006	-0.014
E5	0.190	-0.040	-0.085	-0.027	0.158	-0.057	0.108	0.194	0.137
F1(2)	0.128	0.197	0.135	0.138	0.280	0.218	0.128	0.015	0.250
F2	0.054	0.366	0.065	0.018	0.124	0.031	0.106	0.004	0.294
F3	0.305	0.086	0.178	0.116	0.128	0.056	0.217	0.114	-0.008
F4	0.385	0.245	0.297	0.398	0.149	0.159	0.229	0.121	0.130
F5	0.317	0.049	-0.026	0.071	0.416	0.337	0.253	0.374	0.132
F6	0.248	0.104	0.041	0.026	0.239	0.174	0.168	0.346	0.049
F7	0.324	0.017	0.134	0.046	0.158	0.173	0.248	0.295	-0.039
F8	0.303	-0.077	0.037	-0.033	0.276	0.246	0.233	0.264	0.036
F9	0.300	0.112	0.099	-0.044	0.140	-0.084	0.041	0.033	0.127
F10	0.198	0.205	0.130	0.031	0.089	0.142	-0.004	0.041	-0.070
F11	0.433	0.219	0.072	0.035	0.186	0.171	0.350	0.454	0.111
F12	0.380	0.214	0.023	-0.071	0.465	0.311	0.201	0.322	0.045
F13	0.532	0.216	0.176	0.212	0.359	0.269	0.463	0.366	0.110
F14	0.253	-0.100	0.141	-0.045	0.220	0.184	0.185	0.306	0.215
F15	0.336	0.124	0.174	0.073	0.211	0.247	0.216	0.156	0.112
F16	0.539	0.072	0.179	0.147	0.286	0.268	0.382	0.339	0.011
F17	0.304	0.142	0.315	0.265	0.135	0.045	0.116	-0.029	0.062
G2	-0.222	-0.251	-0.102	-0.136	-0.020	-0.055	-0.100	-0.125	-0.014
VILJELYA	-0.286	-0.120	-0.026	-0.180	-0.029	-0.097	-0.064	0.039	0.082
IKA97	0.229	-0.036	-0.037	-0.024	0.137	0.204	0.158	0.138	0.015
C2PCA1	0.115	-0.199	-0.153	-0.173	0.127	0.140	0.076	0.194	0.129
C2PCA2	0.263	0.137	0.169	0.084	0.039	0.116	0.121	0.040	-0.024
C2PCA3	-0.022	0.173	-0.124	-0.085	0.219	0.110	0.034	0.040	0.307
C2PCA4	0.046	0.141	-0.153	0.114	0.010	-0.133	0.119	-0.011	0.187
C2PCA5	0.350	0.022	0.117	0.018	0.252	0.051	0.059	0.131	0.066
LYPSYL97	-0.196	-0.057	0.003	-0.156	-0.130	-0.040	-0.097	0.041	-0.035
LIHAK97	-0.318	-0.142	-0.110	-0.268	-0.129	-0.095	-0.096	0.095	-0.006
FPCA1	0.187	0.307	0.045	-0.041	0.254	0.229	0.103	0.136	0.171
FPCA2	0.243	0.149	0.104	0.044	0.204	0.076	0.063	-0.039	0.028
FPCA3	0.221	-0.103	-0.035	-0.136	0.225	0.130	0.153	0.318	0.060
FPCA4	0.335	0.090	0.266	0.350	0.051	0.099	0.288	0.165	-0.002

	H10	**H11**	**H12**	**H13**	**H14**	**H15**	**H16**	**H17**	**H18**
H10	1.000								
H11	0.268	1.000							
H12	0.383	0.286	1.000						
H13	0.074	0.259	0.360	1.000					
H14	0.351	0.417	0.314	0.305	1.000				
H15	0.226	0.477	0.314	0.309	0.328	1.000			
H16	0.325	0.428	0.215	0.164	0.482	0.305	1.000		
H17	0.253	0.329	0.245	0.252	0.460	0.510	0.350	1.000	
H18	0.211	0.295	0.416	0.523	0.358	0.321	0.334	0.393	1.000
H19	0.204	0.341	0.356	0.646	0.396	0.312	0.372	0.365	0.637
H20	0.186	0.305	0.162	0.315	0.448	0.262	0.475	0.241	0.446
H21	0.148	0.221	0.438	0.406	0.138	0.292	-0.035	0.276	0.466
H22	0.220	0.536	0.318	0.319	0.568	0.248	0.501	0.400	0.397
H23	0.093	0.577	0.198	0.181	0.545	0.364	0.522	0.375	0.280
I4	0.035	0.044	0.148	0.129	0.235	0.093	0.028	0.162	0.169
A1(2)	-0.214	-0.146	-0.105	-0.001	0.165	-0.187	0.024	0.059	-0.092
A2(2)	0.276	0.083	0.071	-0.129	-0.157	0.054	-0.026	-0.072	-0.044
A11	-0.099	-0.198	-0.066	-0.058	0.199	-0.051	-0.142	0.086	-0.133
A12(2)	-0.164	-0.130	0.025	-0.026	0.052	0.009	-0.177	-0.008	-0.233
C1	0.002	-0.036	0.071	-0.043	0.089	0.055	0.004	0.347	0.099
C2	0.131	0.256	0.193	0.227	0.142	0.417	0.173	0.340	0.135
C3	0.034	0.100	0.043	0.010	0.074	0.041	0.125	0.058	0.032
C4	0.067	-0.012	-0.018	0.053	0.142	0.094	0.224	0.160	-0.006
C5	-0.032	0.007	-0.022	-0.020	0.189	0.027	0.190	0.174	-0.073
C6	0.114	0.154	0.214	0.181	0.171	0.277	0.272	0.230	0.211
C7	-0.012	0.067	-0.007	0.047	0.004	0.218	0.167	0.006	-0.050
C8	-0.019	-0.124	0.144	0.030	0.145	0.031	0.023	0.424	0.144
C9	0.070	0.017	0.254	0.045	0.105	0.146	-0.002	0.302	0.054
C10	0.135	-0.052	0.091	-0.069	0.008	0.043	0.156	0.265	0.022
C11	0.061	0.028	0.315	0.183	0.154	0.211	0.060	0.186	0.238
C12	0.026	0.147	0.430	0.186	0.106	0.099	0.157	0.111	0.313
C13	0.202	0.164	0.148	0.138	0.335	0.304	0.297	0.364	0.188
C14	-0.002	-0.037	0.112	-0.007	-0.172	-0.094	-0.117	-0.216	0.080
C15	0.122	0.007	0.037	-0.124	-0.071	0.152	-0.045	-0.023	-0.116
C16	0.140	0.041	0.283	0.075	0.223	0.109	0.108	0.203	0.113
C17	0.039	0.060	0.038	0.096	-0.035	-0.080	0.142	0.056	0.069
C18	-0.050	0.239	0.054	0.098	0.133	0.175	0.309	0.348	0.112
D1	0.181	0.208	0.177	0.150	0.243	0.287	0.209	0.361	0.113
D2	0.072	0.253	0.013	0.254	0.125	0.158	0.173	0.222	0.102
D3	0.138	0.125	0.159	0.177	-0.003	0.021	0.190	0.102	0.110
D4	0.057	0.299	0.199	0.164	-0.017	0.219	0.008	0.248	0.184
D5	0.081	-0.171	0.211	-0.008	-0.032	-0.022	-0.085	0.000	0.019
D6	-0.033	0.234	0.035	0.303	0.060	0.221	0.104	0.191	0.262
D7	0.147	0.300	0.188	0.265	0.137	0.292	0.136	0.254	0.182
D8	0.033	0.084	0.258	0.147	0.138	0.153	0.071	0.184	0.222
D9	0.238	-0.084	0.225	-0.047	0.075	0.069	0.083	0.122	-0.021
E1	0.002	0.092	0.228	-0.225	0.101	0.222	-0.042	0.166	0.215
E2	0.278	0.175	0.188	-0.060	0.070	0.080	0.305	0.105	0.204
E3	0.078	0.053	0.142	0.081	0.172	0.173	-0.060	0.282	0.161
E4	-0.180	0.044	0.097	0.221	-0.000	0.017	0.092	-0.100	0.162
E5	0.184	0.192	0.174	-0.027	0.119	0.236	0.064	0.337	0.160
F1(2)	-0.029	0.242	-0.106	0.064	0.079	0.066	0.182	-0.003	0.172
F2	0.100	0.101	0.109	0.026	0.071	0.187	0.171	0.239	-0.020
F3	0.178	0.117	0.258	-0.020	0.011	0.060	0.073	-0.074	0.152
F4	0.291	0.210	0.243	0.422	0.184	0.148	0.284	0.192	0.322
F5	0.253	0.148	0.496	0.242	0.340	0.383	0.156	0.280	0.346
F6	0.256	0.138	0.401	0.191	0.350	0.390	0.125	0.179	0.200
F7	0.055	0.022	0.242	0.142	0.025	0.182	0.099	-0.028	0.077
F8	0.173	0.196	0.218	0.155	0.113	0.417	0.072	0.119	0.268
F9	0.089	0.456	0.326	0.299	0.103	0.413	0.192	0.234	0.334
F10	-0.115	0.297	0.122	0.376	-0.016	0.275	0.052	0.155	0.200
F11	0.168	0.177	0.398	0.249	0.120	0.311	0.152	0.354	0.296
F12	0.207	0.304	0.333	0.265	0.173	0.633	0.185	0.349	0.396
F13	0.270	0.087	0.404	0.306	0.127	0.195	0.253	0.105	0.306
F14	0.208	0.077	0.320	0.103	0.128	0.176	0.019	0.437	0.310
F15	0.190	0.200	0.402	0.164	0.155	0.090	0.080	0.124	0.146
F16	0.336	0.148	0.329	0.151	0.149	0.188	0.134	0.117	0.386
F17	0.172	0.177	0.138	0.141	0.170	0.158	0.147	0.114	0.248
G2	0.019	-0.244	-0.134	-0.102	0.017	-0.098	-0.213	0.027	-0.090
VILJELYA	-0.053	-0.071	-0.103	-0.160	0.039	0.076	-0.123	0.229	-0.190
IKA97	0.214	0.146	0.105	0.001	-0.165	0.187	-0.024	-0.059	0.092
C2PCA1	0.089	-0.043	0.217	0.011	0.118	0.115	-0.017	0.360	0.109
C2PCA2	0.039	0.046	0.145	0.126	-0.063	0.020	0.044	-0.087	0.145
C2PCA3	0.049	0.104	-0.042	0.056	0.233	0.143	0.325	0.300	0.027
C2PCA4	0.110	-0.008	0.026	-0.118	-0.072	0.099	0.030	-0.086	-0.125
C2PCA5	0.015	0.164	0.396	0.242	0.202	0.246	0.134	0.331	0.280
LYPSYL97	-0.088	-0.092	-0.013	0.107	0.071	0.142	-0.100	0.140	-0.214
LIHAK97	0.003	-0.032	-0.027	-0.126	0.102	-0.050	-0.095	-0.045	-0.219
FPCA1	0.079	0.236	0.284	0.205	0.142	0.298	0.110	0.333	0.156

FPCA2	-0.026	0.391	0.037	0.144	-0.008	0.232	0.133	-0.021	0.279
FPCA3	0.135	0.126	0.311	0.158	0.117	0.408	0.055	0.253	0.248
FPCA4	0.257	-0.073	0.166	0.100	0.121	-0.112	0.138	-0.069	0.120

	H19	H20	H21	H22	H23	I4	A1(2)	A2(2)	A11
H19	1.000								
H20	0.420	1.000							
H21	0.359	0.089	1.000						
H22	0.450	0.294	0.213	1.000					
H23	0.226	0.440	0.125	0.629	1.000				
I4	-0.012	0.170	-0.098	0.062	0.082	1.000			
A1(2)	-0.035	0.104	-0.048	0.012	0.086	-0.044	1.000		
A2(2)	-0.046	-0.179	-0.028	-0.070	-0.177	0.143	-0.725	1.000	
A11	0.026	0.005	-0.273	-0.047	0.038	0.027	0.138	-0.146	1.000
A12(2)	-0.107	-0.000	-0.247	-0.093	-0.048	-0.007	-0.005	-0.190	0.594
C1	0.083	0.056	0.133	0.104	0.042	0.098	0.007	0.008	0.152
C2	0.208	0.081	0.367	0.200	0.161	-0.018	-0.225	0.124	-0.070
C3	0.056	0.112	-0.083	-0.063	0.160	-0.007	0.036	-0.041	-0.003
C4	0.258	0.122	-0.054	0.065	-0.019	0.046	0.109	-0.038	0.131
C5	0.164	0.014	-0.071	0.112	0.021	0.090	0.101	-0.075	0.228
C6	0.318	0.254	0.066	0.159	0.135	-0.116	-0.034	-0.238	0.121
C7	0.125	0.113	-0.152	0.115	0.048	0.015	0.058	-0.092	-0.141
C8	0.091	0.028	0.158	0.146	0.081	0.115	0.084	-0.037	0.365
C9	0.070	-0.021	0.179	0.237	0.082	0.085	-0.095	0.114	0.096
C10	0.122	-0.100	0.049	0.028	0.125	0.054	0.189	-0.017	-0.003
C11	0.275	0.204	0.224	0.168	0.146	0.049	0.068	-0.152	0.201
C12	0.272	0.112	0.233	0.210	0.084	0.023	-0.200	0.048	0.072
C13	0.286	0.201	0.190	0.248	0.229	0.165	0.060	-0.052	0.084
C14	0.087	-0.004	0.130	-0.113	-0.201	-0.103	0.094	-0.045	-0.213
C15	-0.050	-0.186	-0.006	-0.058	0.029	-0.197	0.070	0.038	-0.021
C16	0.107	0.010	0.080	0.213	0.151	0.125	0.050	-0.027	0.175
C17	0.205	0.103	0.134	0.026	0.062	0.013	-0.022	0.076	-0.064
C18	0.221	0.016	0.057	0.318	0.190	0.110	-0.189	0.132	-0.068
D1	0.276	-0.007	0.058	0.234	0.254	-0.034	0.009	-0.010	0.143
D2	0.297	-0.015	0.027	0.137	0.088	-0.062	-0.237	0.252	-0.040
D3	0.260	0.015	0.043	0.084	0.108	-0.067	-0.126	0.145	-0.137
D4	0.181	-0.030	0.214	0.172	0.056	0.117	-0.420	0.275	-0.145
D5	0.158	-0.190	0.075	-0.102	-0.183	-0.115	-0.107	0.122	-0.131
D6	0.221	0.235	0.038	0.129	0.244	-0.007	-0.222	-0.003	-0.090
D7	0.295	0.124	0.151	0.096	0.275	0.016	-0.253	0.145	-0.009
D8	0.251	0.212	0.090	0.135	0.182	0.024	-0.123	0.021	0.081
D9	-0.019	-0.028	0.084	0.000	-0.038	0.007	-0.099	0.062	0.068
E1	0.171	0.122	0.304	0.044	0.118	0.249	-0.222	0.104	0.000
E2	0.151	0.206	0.018	0.256	0.237	-0.069	-0.021	0.001	0.003
E3	0.021	0.137	0.242	0.108	0.066	0.188	-0.201	0.187	-0.051
E4	0.367	0.023	0.083	0.045	0.004	-0.068	-0.223	0.130	0.029
E5	0.016	0.063	0.194	0.143	0.129	0.215	-0.115	0.165	-0.079
F1(2)	0.203	0.087	0.012	0.126	0.219	-0.065	-0.202	0.153	-0.129
F2	0.189	-0.046	-0.141	0.200	0.140	0.016	0.017	0.057	0.160
F3	0.028	0.166	0.110	0.110	0.173	-0.070	-0.039	0.050	-0.091
F4	0.386	0.382	0.027	0.240	0.163	0.152	-0.159	0.169	-0.127
F5	0.243	0.248	0.248	0.272	0.242	0.219	-0.155	0.094	0.058
F6	0.165	0.159	0.163	0.195	0.212	0.283	-0.146	0.073	0.161
F7	0.090	-0.047	0.076	0.014	0.029	0.150	-0.110	0.167	-0.006
F8	0.125	0.100	0.248	0.056	0.122	0.092	-0.208	0.204	-0.036
F9	0.316	0.056	0.312	0.231	0.187	0.062	-0.275	0.176	-0.134
F10	0.327	0.037	0.134	0.157	0.117	0.007	-0.243	0.162	-0.120
F11	0.237	0.145	0.339	0.216	0.151	0.096	-0.314	0.290	-0.015
F12	0.260	0.120	0.360	0.153	0.237	0.102	-0.317	0.222	-0.037
F13	0.268	0.177	0.261	0.130	0.155	0.122	-0.241	0.222	-0.070
F14	0.170	0.106	0.242	0.108	0.096	0.109	-0.243	0.146	0.203
F15	0.226	0.097	-0.030	0.273	0.103	-0.039	-0.061	0.019	0.080
F16	0.166	0.252	0.232	0.199	0.228	0.105	-0.276	0.192	-0.058
F17	0.130	0.279	0.010	0.121	0.236	0.031	-0.168	0.068	0.014
G2	-0.224	-0.231	-0.102	-0.217	-0.205	0.215	0.001	0.062	0.003
VILJELYA	-0.193	-0.055	-0.155	0.048	0.113	0.013	-0.140	-0.019	0.396
IKA97	0.035	-0.104	0.048	-0.012	-0.086	0.044	-1.000	0.725	-0.138
C2PCA1	0.052	-0.043	0.215	0.152	0.064	0.065	0.013	0.030	0.211
C2PCA2	0.244	0.161	0.158	0.155	-0.030	-0.132	0.048	0.131	-0.071
C2PCA3	0.251	0.102	-0.015	0.165	0.090	0.141	0.056	-0.015	0.097
C2PCA4	-0.042	-0.095	-0.164	-0.077	-0.008	-0.107	0.153	-0.034	-0.122
C2PCA5	0.238	0.195	0.277	0.325	0.252	0.131	-0.233	0.067	0.140
LYPSYL97	0.046	0.025	-0.053	-0.044	-0.069	0.108	-0.063	0.027	0.279
LIHAK97	-0.151	-0.069	-0.142	-0.049	0.125	0.123	-0.007	-0.048	0.239
FPCA1	0.301	0.017	0.033	0.286	0.166	0.004	-0.136	0.076	0.115
FPCA2	0.186	0.109	0.225	0.132	0.220	-0.133	-0.251	0.158	-0.289
FPCA3	0.124	0.012	0.335	0.044	0.076	0.182	-0.206	0.175	0.055
FPCA4	0.054	0.277	-0.053	0.068	0.096	0.110	-0.040	0.063	-0.015

	A12(2)	C1	C2	C3	C4	C5	C6	C7	C8
A12(2)	1.000								
C1	0.208	1.000							
C2	0.132	0.399	1.000						
C3	-0.065	-0.048	-0.104	1.000					
C4	0.032	0.261	0.307	0.310	1.000				
C5	0.152	0.273	0.223	0.369	0.738	1.000			
C6	0.146	0.072	0.430	0.239	0.397	0.287	1.000		
C7	-0.096	-0.119	0.062	0.146	0.271	0.124	0.325	1.000	
C8	0.236	0.711	0.342	0.020	0.180	0.285	0.150	-0.179	1.000
C9	0.114	0.311	0.224	0.258	0.323	0.310	0.143	0.100	0.438
C10	-0.040	0.467	0.170	0.237	0.527	0.428	0.189	0.254	0.403
C11	0.184	0.239	0.320	0.288	0.346	0.317	0.426	-0.091	0.276
C12	0.082	0.186	0.259	0.243	0.200	0.298	0.376	-0.136	0.308
C13	-0.099	0.264	0.333	0.379	0.691	0.679	0.353	0.211	0.296
C14	-0.113	0.110	-0.058	0.282	0.218	0.228	0.213	-0.015	0.037
C15	0.067	0.081	0.125	0.178	0.209	0.109	0.074	0.087	0.033
C16	0.137	0.404	0.346	0.081	0.264	0.323	0.155	-0.124	0.477
C17	-0.238	0.026	0.151	0.355	0.404	0.309	0.313	0.252	0.062
C18	0.028	0.355	0.367	-0.006	0.309	0.331	0.247	0.058	0.205
D1	-0.002	0.351	0.454	0.169	0.468	0.461	0.282	0.134	0.330
D2	-0.030	-0.037	0.258	0.135	0.230	0.196	0.139	0.086	-0.019
D3	-0.187	-0.073	0.091	0.061	0.090	-0.008	0.054	0.161	-0.046
D4	-0.043	0.170	0.278	0.029	0.217	0.153	0.110	-0.077	0.124
D5	-0.124	0.121	0.068	0.347	0.279	0.228	0.120	0.048	0.166
D6	0.115	0.043	0.073	0.215	0.020	0.031	0.180	0.038	-0.058
D7	0.017	0.002	0.340	0.156	0.132	0.124	0.144	0.028	0.050
D8	-0.018	0.158	0.198	0.111	0.222	0.211	0.231	-0.093	0.120
D9	0.091	0.222	0.258	0.201	0.203	0.450	0.097	-0.149	0.318
E1	0.157	0.086	0.108	0.189	0.111	0.152	-0.020	-0.166	0.130
E2	-0.193	0.075	0.075	0.079	0.088	-0.034	0.154	0.169	0.056
E3	0.111	0.215	0.309	0.063	0.154	0.060	0.178	0.015	0.304
E4	0.143	0.121	0.163	-0.036	0.241	0.252	0.308	0.010	0.001
E5	-0.209	0.128	0.146	0.166	0.254	0.253	0.081	-0.019	0.187
F1(2)	-0.101	0.087	0.181	0.015	0.160	0.106	0.118	0.027	0.046
F2	0.153	0.179	0.304	0.184	0.617	0.387	0.189	0.182	0.072
F3	-0.089	0.044	0.005	-0.048	-0.160	-0.221	0.022	0.161	0.037
F4	-0.139	0.159	0.156	0.006	0.165	0.037	0.154	0.150	0.050
F5	0.073	0.252	0.315	0.116	0.312	0.275	0.269	0.032	0.259
F6	0.149	0.268	0.295	0.253	0.199	0.298	0.211	0.094	0.208
F7	-0.011	0.205	0.188	0.286	0.259	0.299	0.047	-0.073	0.145
F8	0.020	0.246	0.494	0.011	0.221	0.098	0.182	-0.211	0.234
F9	-0.098	0.014	0.276	0.085	0.038	0.045	0.160	-0.130	0.024
F10	0.057	0.131	0.306	-0.135	0.013	0.038	0.012	0.058	0.034
F11	0.105	0.298	0.248	-0.011	-0.145	-0.149	0.085	-0.032	0.307
F12	0.042	0.303	0.470	-0.077	0.110	0.007	0.189	0.002	0.208
F13	-0.033	0.199	0.232	0.193	0.132	0.069	0.193	-0.045	0.097
F14	0.255	0.574	0.442	0.141	0.241	0.336	0.165	-0.270	0.596

F15	0.077	0.156	0.150	-0.016	0.196	0.145	0.213	-0.019	0.085
F16	-0.173	0.192	0.096	-0.024	-0.067	-0.176	0.063	-0.190	0.175
F17	-0.097	-0.077	-0.018	0.007	-0.060	-0.150	0.122	-0.101	-0.048
G2	0.040	0.201	0.045	0.046	-0.068	-0.107	-0.190	0.014	0.115
VILJELYA	0.670	0.361	0.269	-0.049	-0.019	0.073	0.050	-0.137	0.376
IKA97	0.005	-0.007	0.225	-0.036	-0.109	-0.101	0.034	-0.058	-0.084
C2PCA1	0.246	0.803	0.518	-0.131	0.157	0.182	0.106	-0.221	0.827
C2PCA2	-0.053	0.026	0.232	0.310	0.343	0.274	0.633	0.129	0.016
C2PCA3	-0.016	0.248	0.268	0.346	0.827	0.824	0.301	0.207	0.180
C2PCA4	-0.108	-0.143	-0.185	0.534	0.269	0.139	0.112	0.562	-0.139
C2PCA5	0.140	0.199	0.360	0.311	0.142	0.200	0.314	0.007	0.368
LYPSYL97	0.616	0.213	0.269	0.092	0.076	0.103	0.057	0.093	0.299
LIHAK97	0.478	0.189	0.156	0.095	0.173	0.154	0.093	-0.033	0.196
FPCA1	0.192	0.245	0.340	-0.031	0.345	0.249	0.198	0.096	0.139
FPCA2	-0.226	-0.122	0.088	-0.220	-0.270	-0.338	0.028	-0.003	-0.117
FPCA3	0.134	0.348	0.471	0.181	0.231	0.279	0.152	-0.189	0.356
FPCA4	-0.140	0.021	-0.171	0.109	-0.072	-0.114	0.025	0.038	-0.005

	C9	C10	C11	C12	C13	C14	C15	C16	C17
C9	1.000								
C10	0.281	1.000							
C11	0.242	0.178	1.000						
C12	0.310	0.154	0.482	1.000					
C13	0.238	0.523	0.406	0.291	1.000				
C14	0.041	0.234	0.371	0.203	0.115	1.000			
C15	0.235	0.276	0.123	0.019	0.082	0.239	1.000		
C16	0.327	0.337	0.245	0.324	0.325	0.082	0.209	1.000	
C17	0.066	0.398	0.180	0.227	0.424	0.221	0.100	0.100	1.000
C18	0.176	0.279	0.037	0.103	0.315	0.046	-0.057	0.104	0.153
D1	0.344	0.256	0.290	0.287	0.455	0.007	0.312	0.523	0.065
D2	0.022	0.107	0.056	0.135	0.210	0.062	0.037	-0.154	0.399
D3	-0.088	0.199	0.146	0.162	0.168	-0.079	0.066	-0.069	0.311
D4	0.319	0.066	0.321	0.268	0.271	0.035	-0.059	0.057	0.060
D5	0.466	0.251	0.250	0.335	0.163	0.273	0.259	0.223	0.112
D6	0.109	-0.240	0.043	0.105	-0.009	0.025	-0.135	-0.199	0.167
D7	0.094	-0.051	0.163	0.165	0.239	-0.090	0.071	-0.059	0.307
D8	0.112	-0.029	0.627	0.403	0.273	0.234	-0.160	0.132	0.119
D9	0.365	0.251	0.129	0.370	0.325	0.075	0.298	0.490	0.033
E1	0.291	0.018	0.333	0.248	0.183	0.164	0.177	-0.024	0.171
E2	0.001	0.273	0.011	0.028	0.211	-0.085	0.110	0.236	0.144
E3	0.315	-0.040	0.190	0.232	0.185	-0.066	0.027	0.071	-0.049
E4	-0.030	-0.095	0.336	0.420	0.062	0.261	-0.034	0.003	0.204
E5	0.360	0.250	0.146	0.061	0.360	0.151	0.233	0.083	0.073
F1(2)	-0.056	0.007	0.051	0.315	0.108	0.056	0.018	0.145	0.262
F2	0.253	0.380	0.466	0.182	0.413	0.057	0.209	0.273	0.130
F3	0.097	0.042	0.210	0.144	-0.077	0.076	-0.114	0.035	0.049
F4	-0.009	0.058	0.294	0.156	0.182	0.136	-0.112	0.019	0.120
F5	0.372	0.155	0.405	0.328	0.426	0.180	0.087	0.266	0.004
F6	0.285	0.163	0.465	0.321	0.421	0.179	0.115	0.211	0.044
F7	0.157	0.282	0.412	0.347	0.280	0.294	0.153	0.184	0.178
F8	0.251	0.070	0.300	0.195	0.222	0.213	0.161	0.211	-0.007
F9	0.118	-0.093	0.102	0.332	0.056	0.151	0.069	-0.019	0.022
F10	0.010	-0.164	-0.022	0.102	-0.118	0.062	-0.025	-0.079	0.023
F11	0.383	-0.006	0.163	0.230	-0.143	0.031	0.031	-0.026	0.022
F12	0.190	0.157	0.189	0.257	0.190	0.013	0.192	0.174	0.013
F13	0.188	0.199	0.462	0.497	0.202	0.255	0.188	0.137	0.276
F14	0.358	0.153	0.362	0.420	0.340	0.040	0.027	0.432	0.078
F15	0.098	-0.027	0.429	0.282	0.083	0.123	-0.040	0.175	-0.039
F16	0.120	-0.058	0.376	0.339	0.062	0.183	0.004	0.103	0.020
F17	-0.109	-0.268	0.231	0.307	0.026	0.006	-0.160	-0.067	-0.065
G2	0.031	0.193	-0.302	-0.252	-0.040	-0.191	-0.022	0.084	-0.050
VILJELYA	0.264	-0.043	0.121	0.039	-0.077	-0.219	0.089	0.273	-0.253
IKA97	0.095	-0.189	-0.068	0.200	-0.060	-0.094	-0.070	-0.050	0.022
C2PCA1	0.464	0.424	0.236	0.268	0.186	0.049	0.269	0.729	-0.023
C2PCA2	-0.068	0.189	0.569	0.301	0.260	0.750	0.194	0.113	0.595
C2PCA3	0.195	0.540	0.254	0.163	0.833	0.085	-0.029	0.133	0.372
C2PCA4	0.294	0.433	-0.033	-0.043	0.179	0.237	0.692	0.116	0.241
C2PCA5	0.638	0.009	0.562	0.706	0.285	-0.123	-0.161	0.168	0.117
LYPSYL97	0.275	0.018	0.091	-0.003	-0.024	-0.117	-0.022	0.092	0.010
LIHAK97	0.192	0.042	0.082	-0.039	0.075	-0.016	0.155	0.085	0.015
FPCA1	0.204	0.096	0.302	0.214	0.181	0.004	0.103	0.195	-0.004
FPCA2	-0.119	-0.265	-0.197	0.141	-0.286	0.007	-0.070	-0.155	0.035
FPCA3	0.365	0.215	0.269	0.278	0.334	0.176	0.207	0.269	0.054
FPCA4	-0.040	0.001	0.335	0.197	0.061	0.132	-0.129	-0.025	0.090

	C18	D1	D2	D3	D4	D5	D6	D7	D8
C18	1.000								
D1	0.298	1.000							
D2	0.457	0.171	1.000						
D3	0.100	0.136	0.457	1.000					
D4	0.265	0.256	0.253	0.247	1.000				
D5	-0.061	0.398	0.190	0.161	0.368	1.000			
D6	0.258	-0.071	0.502	0.156	0.252	0.036	1.000		
D7	0.168	0.203	0.626	0.414	0.342	0.265	0.585	1.000	
D8	0.115	0.285	0.147	0.312	0.447	0.218	0.183	0.269	1.000
D9	0.049	0.477	0.000	-0.020	0.018	0.447	-0.146	0.139	0.048
E1	0.011	0.034	0.225	0.017	0.370	0.311	0.270	0.357	0.211
E2	0.219	0.218	-0.010	0.049	0.005	0.055	-0.147	0.186	0.017
E3	0.115	0.222	0.072	0.047	0.454	0.289	0.192	0.186	0.220
E4	0.214	0.167	0.246	0.215	0.233	0.183	0.317	0.264	0.449
E5	0.233	0.203	0.138	-0.037	0.502	0.221	0.032	0.105	0.146
F1(2)	0.203	0.110	0.167	0.148	0.081	-0.077	0.189	0.193	0.206
F2	0.305	0.531	0.202	0.187	0.253	0.187	-0.094	0.176	0.355
F3	0.034	0.058	0.029	0.025	0.039	0.055	0.053	0.057	0.274
F4	0.191	0.287	0.172	0.210	0.280	0.079	0.130	0.196	0.503
F5	0.357	0.376	0.151	-0.001	0.272	0.153	0.059	0.134	0.325
F6	0.223	0.355	0.055	-0.041	0.232	0.178	-0.040	0.128	0.380
F7	0.136	0.294	0.143	0.010	0.227	0.345	-0.078	0.044	0.277
F8	0.179	0.236	0.173	-0.045	0.363	0.177	0.150	0.202	0.267
F9	0.263	0.150	0.303	0.009	0.316	0.118	0.272	0.192	0.214
F10	0.296	0.223	0.380	0.044	0.222	0.002	0.338	0.274	0.103
F11	0.240	-0.020	0.172	-0.110	0.224	0.145	0.254	0.243	0.095
F12	0.437	0.377	0.266	0.056	0.216	0.030	0.143	0.234	0.156
F13	0.169	0.180	0.188	0.218	0.197	0.270	0.042	0.184	0.323
F14	0.330	0.479	0.170	-0.037	0.381	0.225	0.167	0.224	0.288
F15	0.098	0.264	0.027	0.077	0.241	0.086	0.006	0.073	0.448
F16	0.125	0.148	-0.023	0.017	0.254	0.104	-0.006	0.092	0.433
F17	0.184	0.174	0.114	0.140	0.209	-0.006	0.089	0.120	0.451
G2	0.009	-0.033	-0.046	-0.129	-0.093	0.024	-0.065	-0.056	-0.261
VILJELYA	0.198	0.238	-0.076	-0.226	0.000	-0.050	0.114	-0.010	-0.051
IKA97	0.189	-0.009	0.237	0.126	0.420	0.107	0.222	0.253	0.123
C2PCA1	0.184	0.445	-0.121	-0.096	0.128	0.206	-0.141	-0.008	0.074
C2PCA2	0.063	0.091	0.211	0.100	0.058	0.166	0.139	0.141	0.349
C2PCA3	0.563	0.399	0.347	0.139	0.250	0.114	0.074	0.191	0.203
C2PCA4	-0.190	0.185	-0.030	0.098	-0.152	0.343	-0.116	-0.041	-0.233
C2PCA5	0.150	0.277	0.134	0.125	0.414	0.314	0.255	0.280	0.444
LYPSYL97	0.111	0.031	0.155	-0.006	-0.045	0.054	0.245	0.204	-0.108
LIHAK97	0.045	0.093	-0.038	-0.091	-0.059	-0.088	0.063	-0.006	-0.081
FPCA1	0.362	0.435	0.223	0.097	0.242	0.040	0.085	0.208	0.261
FPCA2	0.140	-0.141	0.198	0.040	0.035	-0.167	0.320	0.160	0.043
FPCA3	0.262	0.311	0.209	-0.094	0.315	0.265	0.123	0.170	0.116
FPCA4	-0.066	0.031	-0.101	0.112	0.074	0.116	-0.113	-0.010	0.408

	D9	E1	E2	E3	E4	E5	F1(2)	F2	F3
D9	1.000								
E1	0.257	1.000							

E2	0.174	-0.015	1.000						
E3	0.197	0.368	-0.031	1.000					
E4	-0.084	0.169	-0.136	0.103	1.000				
E5	0.254	0.349	0.252	0.315	-0.156	1.000			
F1(2)	-0.068	-0.012	0.076	0.019	0.398	-0.139	1.000		
F2	0.092	0.011	0.236	0.060	0.227	0.058	0.188	1.000	
F3	-0.053	-0.039	0.408	0.000	0.054	0.006	0.252	0.104	1.000
F4	-0.111	0.085	0.215	0.061	0.305	0.070	0.180	0.270	0.391
F5	0.296	0.354	0.200	0.334	0.126	0.360	0.107	0.360	0.229
F6	0.347	0.312	0.173	0.199	0.111	0.331	0.069	0.328	0.256
F7	0.319	0.412	0.078	0.060	0.136	0.247	0.109	0.286	0.215
F8	0.257	0.343	0.026	0.255	0.060	0.399	0.226	0.133	0.182
F9	0.096	0.333	-0.109	0.225	0.112	0.251	0.143	-0.014	-0.062
F10	-0.076	0.252	-0.178	0.094	0.310	-0.013	0.208	0.111	0.027
F11	0.023	0.449	0.130	0.253	0.192	0.104	0.042	-0.002	0.236
F12	0.118	0.307	0.191	0.103	0.233	0.196	0.197	0.264	0.201
F13	0.263	0.445	0.189	0.066	0.340	0.108	0.265	0.277	0.254
F14	0.408	0.366	0.135	0.400	0.126	0.290	0.094	0.262	0.078
F15	-0.005	0.077	0.167	0.029	0.328	0.050	0.144	0.443	0.245
F16	0.059	0.223	0.327	0.121	0.241	0.190	0.271	0.164	0.518
F17	-0.086	0.036	0.264	0.221	0.287	0.048	0.380	0.195	0.410
G2	0.029	-0.059	0.019	0.096	-0.437	-0.002	-0.129	-0.135	-0.055
VILJELYA	0.237	0.059	-0.055	0.254	0.028	-0.039	0.018	0.232	0.005
IKA97	0.099	0.222	0.021	0.201	0.223	0.115	0.202	-0.017	0.039
C2PCA1	0.420	0.083	0.120	0.240	-0.013	0.162	0.068	0.153	0.045
C2PCA2	0.018	0.157	0.011	-0.022	0.409	0.053	0.176	0.144	0.083
C2PCA3	0.222	0.102	0.130	0.100	0.158	0.311	0.120	0.508	-0.172
C2PCA4	0.172	0.028	0.188	-0.060	-0.192	0.166	-0.058	0.192	0.001
C2PCA5	0.226	0.329	-0.005	0.391	0.224	0.147	0.117	0.253	0.243
LYPSYL97	0.085	0.218	-0.298	0.218	0.096	-0.259	-0.139	0.118	-0.143
LIHAK97	-0.013	0.073	-0.260	0.124	0.052	-0.075	-0.119	0.182	-0.156
FPCA1	0.011	0.133	0.097	0.089	0.352	0.022	0.157	0.663	-0.017
FPCA2	-0.252	0.012	0.018	0.002	0.222	-0.101	0.625	-0.248	0.383
FPCA3	0.451	0.487	-0.036	0.313	-0.053	0.436	-0.060	0.089	-0.059
FPCA4	-0.021	0.033	0.340	0.004	0.175	0.008	0.141	0.123	0.572

	F4	F5	F6	F7	F8	F9	F10	F11	F12
F4	1.000								
F5	0.270	1.000							
F6	0.309	0.660	1.000						
F7	0.288	0.462	0.644	1.000					
F8	0.086	0.497	0.462	0.539	1.000				
F9	0.081	0.192	0.129	0.298	0.492	1.000			
F10	0.279	0.278	0.097	0.302	0.309	0.543	1.000		
F11	0.291	0.288	0.268	0.189	0.205	0.330	0.340	1.000	
F12	0.273	0.571	0.452	0.328	0.449	0.357	0.437	0.503	1.000
F13	0.429	0.388	0.557	0.585	0.298	0.211	0.110	0.530	0.469
F14	0.262	0.537	0.429	0.379	0.422	0.266	0.309	0.402	0.447
F15	0.471	0.436	0.251	0.236	0.054	0.049	0.370	0.246	0.238
F16	0.539	0.478	0.491	0.376	0.309	0.110	0.114	0.469	0.517
F17	0.466	0.271	0.196	0.020	0.058	0.222	0.102	0.221	0.316
G2	-0.169	-0.104	-0.041	-0.045	0.060	-0.092	-0.129	-0.090	-0.072
VILJELYA	-0.162	0.107	0.140	-0.016	0.072	-0.091	0.022	0.188	0.185
IKA97	0.159	0.155	0.146	0.110	0.208	0.275	0.243	0.314	0.317
C2PCA1	0.026	0.266	0.216	0.164	0.340	0.035	0.055	0.290	0.323
C2PCA2	0.208	0.156	0.184	0.252	0.203	0.139	0.072	0.026	0.052
C2PCA3	0.152	0.333	0.284	0.267	0.137	0.070	0.012	-0.154	0.141
C2PCA4	-0.089	0.002	0.083	0.100	-0.109	-0.093	-0.187	-0.093	-0.045
C2PCA5	0.187	0.400	0.416	0.261	0.222	0.250	0.103	0.428	0.261
LYPSYL97	-0.091	-0.005	0.080	-0.033	-0.002	-0.034	0.205	0.234	0.082
LIHAK97	-0.192	0.117	0.142	0.008	0.081	-0.079	0.005	-0.080	0.042
FPCA1	0.285	0.525	0.247	0.148	0.057	0.137	0.565	0.305	0.533
FPCA2	0.068	-0.035	-0.213	-0.117	0.249	0.511	0.421	0.267	0.320
FPCA3	-0.057	0.527	0.549	0.628	0.806	0.560	0.300	0.283	0.469
FPCA4	0.678	0.148	0.400	0.281	-0.105	-0.286	-0.251	0.224	0.025

	F13	F14	F15	F16	F17	G2	VILJELYA	IKA97	C2PCA1
F13	1.000								
F14	0.352	1.000							
F15	0.290	0.317	1.000						
F16	0.634	0.360	0.479	1.000					
F17	0.354	0.202	0.371	0.645	1.000				
G2	-0.201	0.042	-0.382	-0.242	-0.220	1.000			
VILJELYA	0.005	0.393	0.027	0.046	0.046	0.084	1.000		
IKA97	0.241	0.243	0.061	0.276	0.168	-0.001	0.140	1.000	
C2PCA1	0.167	0.584	0.124	0.185	-0.138	0.183	0.434	-0.013	1.000
C2PCA2	0.334	0.083	0.202	0.167	0.068	-0.277	-0.193	-0.048	0.004
C2PCA3	0.096	0.274	0.094	-0.102	-0.020	-0.023	-0.032	-0.056	0.032
C2PCA4	0.076	-0.217	-0.132	-0.159	-0.229	0.080	-0.129	-0.153	-0.047
C2PCA5	0.402	0.461	0.277	0.331	0.268	-0.149	0.230	0.233	0.245
LYPSYL97	-0.026	0.197	-0.069	-0.227	-0.187	0.191	0.564	0.063	0.244
LIHAK97	-0.111	0.132	-0.066	-0.162	-0.170	0.137	0.495	0.007	0.198
FPCA1	0.227	0.406	0.769	0.287	0.248	-0.277	0.225	0.136	0.209
FPCA2	0.052	-0.121	0.010	0.245	0.406	-0.121	-0.126	0.251	-0.090
FPCA3	0.333	0.614	-0.119	0.115	-0.162	0.156	0.166	0.206	0.414
FPCA4	0.557	0.067	0.323	0.698	0.570	-0.161	-0.088	0.040	-0.080

	C2PCA2	C2PCA3	C2PCA4	C2PCA5	LYPSYL97	LIHAK97	FPCA1	FPCA2	FPCA3
C2PCA2	1.000								
C2PCA3	0.180	1.000							
C2PCA4	0.153	0.078	1.000						
C2PCA5	0.048	0.167	-0.106	1.000					
LYPSYL97	-0.047	0.041	-0.024	0.254	1.000				
LIHAK97	0.027	0.101	0.049	0.068	0.518	1.000			
FPCA1	0.083	0.278	-0.046	0.263	0.173	0.120	1.000		
FPCA2	0.038	-0.281	-0.165	0.030	-0.169	-0.239	0.004	1.000	
FPCA3	0.131	0.261	-0.007	0.310	0.156	0.176	0.050	-0.043	1.000
FPCA4	0.160	-0.062	-0.018	0.218	-0.205	-0.214	-0.051	-0.079	-0.255

	FPCA4
FPCA4	1.000

Appendix 8

Discriminant analysis for the adjustment decision

MULTIVARIATE TEST STATISTICS

WILKS' LAMBDA =	0.508				
F-STATISTIC =	5.548	DF = 35,1112		PROB =	0.000
PILLAI TRACE =	0.578				
F-STATISTIC =	5.003	DF = 35,1340		PROB =	0.000
HOTELLING-LAWLEY TRACE =	0.807				
F-STATISTIC =	6.050	DF = 35,1312		PROB =	0.000
THETA =	0.364 S = 5, M = .5, N =131.0			PROB =	0.000

TEST OF RESIDUAL ROOTS

ROOTS 1 THROUGH 5				
CHI-SQUARE STATISTIC =	181.647	DF = 35	PROB =	0.000
ROOTS 2 THROUGH 5				
CHI-SQUARE STATISTIC =	60.321	DF = 24	PROB =	0.000
ROOTS 3 THROUGH 5				
CHI-SQUARE STATISTIC =	25.889	DF = 15	PROB =	0.039
ROOTS 4 THROUGH 5				
CHI-SQUARE STATISTIC =	8.515	DF = 8	PROB =	0.385
ROOTS 5 THROUGH 5				
CHI-SQUARE STATISTIC =	1.043	DF = 3	PROB =	0.791

CANONICAL CORRELATIONS

1	2	3	4	5
0.603	0.347	0.250	0.166	0.062

DEPENDENT VARIABLE CANONICAL COEFFICIENTS
STANDARDIZED BY CONDITIONAL (WITHIN GROUPS) STANDARD DEVIATIONS

	1	2	3	4	5
IKA97	-0.248	-0.580	0.545	0.201	0.529
VILJELYA	0.474	0.051	0.236	-0.513	-0.169
C2PCA1	0.220	0.068	-0.259	0.214	0.673
A12(2)	0.469	0.172	0.341	0.194	0.147
G2	-0.143	0.319	-0.317	-0.147	0.628
FPCA3	0.198	0.108	-0.098	0.795	-0.364
TSUUNTAU	-0.336	0.718	0.600	0.186	-0.031

CANONICAL LOADINGS (CORRELATIONS BETWEEN CONDITIONAL
DEPENDENT VARIABLES AND DEPENDENT CANONICAL FACTORS)

	1	2	3	4	5
IKA97	-0.194	-0.533	0.599	0.243	0.451
VILJELYA	0.646	0.215	0.405	-0.320	0.149
C2PCA1	0.409	0.181	-0.221	0.318	0.557
A12(2)	0.763	0.006	0.341	-0.011	0.068
G2	-0.167	0.425	-0.261	-0.128	0.594
FPCA3	0.229	0.133	-0.084	0.855	-0.083
TSUUNTAU	-0.385	0.720	0.522	0.120	0.034

Appendix 9

Comparison of changes in objectives in relation to adjustment into the EU.

Comparison of changes in objectives for maintained farmers

Objective	Mean in 1998	Mean in 1993	Diffe-rence	Risk (p)
Increasing farm size	2.81	3.57	-0.91	0.000
	(1.60)	(1.79)	(1.84)	
Ensuring continuity	4.19	4.88	-0.68	0.000
	(1.75)	(1.54)	(1.95)	
Improving quality of life	4.78	4.76	0.17	0.183
	(1.32)	(1.34)	(1.56)	
Increasing profit	4.31	4.72	-0.42	0.001
	(1.46)	(1.26)	(1.55)	
Improving profit for capital	4.58	4.76	-0.21	0.099
	(1.28)	(1.30)	(1.58)	
Avoiding losses	5.32	5.64	-0.24	0.023
	(1.21)	(0.75)	(1.31)	
Increasing leisure	4.19	3.78	+0.45	0.000
	(1.50)	(1.61)	(1.58)	
Expanding production	2.82	3.62	-0.71	0.000
	(1.51)	(1.59)	(1.66)	
Improving quality of products	4.41	5.53	-1.09	0.000
	(1.46)	(0.83)	(1.62)	
Increasing assets	3.29	3.61	-0.25	0.013
	(1.54)	(1.55)	(1.69)	
Ensuring liquidity	5.43	5.64	-0.20	0.013
	(0.85)	(0.76)	(0.98)	
Taking care of the environment	4.93	5.09	-0.28	0.221
	(1.07)	(1.01)	(1.30)	
Increasing total incomes	4.52	4.18	+0.33	0.013
	(1.34)	(1.45)	(1.62)	
Maintaining low degree of debt to assets	4.50	5.19	-0.65	0.000
	(1.68)	(1.13)	(1.89)	
Increasing household spending	2.47	2.48	+0.10	0.451
	(1.27)	(1.40)	(1.59)	
Obtaining new and bigger machinery and buildings	2.28	2.66	-0.35	0.007
	(1.36)	(1.33)	(1.64)	
Reducing risk	4.84	n.a.	-	-
	(1.19)			
Increasing supports	4.78	n.a.	-	-
	(1.43)			

Number of cases 167, scale from 1 to 6 (1=not important, 6=very important). N.a. means that the question was not asked in the 1993 survey. Means in 1998 and in 1993 are calculated with all cases. However, the difference between objectives in 1993 and in 1993 is calculated in pairs, thus the distinction between mean in 1998 and mean in 1993 differs from the column 'difference'. Standard deviation is presented in parenthesis. T-test is used here as a standard measure to compare values. To test the hypothesis that the 1998 and 1993 values have the same mean, the two-tailed test is used to calculate the p-values.

Comparison of changes in objectives for expanded farmers

Objective	Mean in 1998	Mean in 1993	Diffe-rence	Risk (p)
Increasing farm size	4.18	4.20	-0.03	0.863
	(1.47)	(1.66)	(1.80)	
Ensuring continuity	4.68	4.98	-0.30	0.108
	(1.63)	(1.52)	(1.79)	
Improving quality of life	5.02	4.70	+0.39	0.034
	(1.21)	(1.51)	(1.74)	
Increasing profit	4.56	4.88	-0.28	0.138
	(1.41)	(1.21)	(1.80)	
Improving profit for capital	4.93	5.16	-0.17	0.216
	(0.97)	(0.99)	(1.34)	
Avoiding losses	5.60	5.55	+0.04	0.700
	(0.85)	(0.96)	(1.07)	
Increasing leisure	4.33	3.74	+0.46	0.026
	(1.57)	(1.51)	(1.97)	
Expanding production	3.91	4.37	-0.42	0.024
	(1.44)	(1.46)	(1.77)	
Improving quality of products	4.45	5.51	-1.09	0.000
	(1.53)	(0.91)	(1.60)	
Increasing assets	3.48	3.64	-0.19	0.363
	(1.62)	(1.61)	(1.94)	
Ensuring liquidity	5.65	5.75	-0.08	0.485
	(0.75)	(0.63)	(1.04)	
Taking care of the environment	4.94	5.31	-0.29	0.026
	(1.18)	(0.86)	(1.24)	
Increasing total incomes	4.71	4.31	+0.34	0.044
	(1.24)	(1.36)	(1.63)	
Maintaining low degree of debt to assets	4.33	5.03	-0.62	0.001
	(1.53)	(1.14)	(1.70)	
Increasing household spending	2.23	2.18	+0.12	0.501
	(1.33)	(1.35)	(0.69)	
Obtaining new and bigger machinery and buildings	2.97	2.77	+0.16	0.379
	(1.48)	(1.46)	(1.77)	
Reducing risk	4.95	n.a.	-	-
	(1.16)			
Increasing supports	4.73	n.a.	-	-
	(1.30)			

Number of cases 93, scale from 1 to 6 (1=not important, 6=very important). N.a. means that the question was not asked in the 1993 survey. Means in 1998 and in 1993 are calculated with all cases. However, the difference between objectives in 1993 and in 1993 is calculated in pairs, thus the distinction between mean in 1998 and mean in 1993 differs from the column ‘difference’. Standard deviation is presented in parenthesis. T-test is used here as a standard measure to compare values. To test the hypothesis that the 1998 and 1993 values have the same mean, the two-tailed test is used to calculate the p-values.

Comparison of changes in objectives for reduced farmers

Objective	Mean in 1998	Mean in 1993	Diffe-rence	Risk (p)
Increasing farm size	1.27	2.07	-0.30	0.394
	(0.65)	(1.39)	(1.06)	
Ensuring continuity	3.36	4.21	-0.10	0.823
	(2.16)	(1.81)	(1.37)	
Improving quality of life	4.27	5.00	-0.90	0.302
	(2.01)	(1.30)	(2.60)	
Increasing profit	2.91	4.57	-1.70	0.038
	(1.81)	(1.60)	(2.21)	
Improving profit for capital	3.64	5.14	-1.40	0.143
	(1.96)	(1.10)	(2.76)	
Avoiding losses	4.82	5.86	-1.20	0.104
	(1.99)	(0.36)	(2.10)	
Increasing leisure	5.27	3.43	+1.30	0.146
	(1.91)	(1.72)	(2.58)	
Expanding production	1.46	2.43	-1.00	0.032
	(0.82)	(1.65)	(1.25)	
Improving quality of products	3.55	5.36	-2.20	0.016
	(2.42)	(0.84)	(2.35)	
Increasing assets	2.36	2.43	0.00	1.000
	(1.80)	(1.45)	(2.71)	
Ensuring liquidity	5.36	5.86	-0.60	0.279
	(1.50)	(0.36)	(1.65)	
Taking care of the environment	4.82	5.14	-0.30	0.520
	(1.47)	(1.10)	(1.42)	
Increasing total incomes	3.46	4.64	-1.40	0.034
	(1.86)	(1.55)	(1.78)	
Maintaining low degree of debt to assets	3.82	5.50	-1.80	0.058
	(2.14)	(0.94)	(2.62)	
Increasing household spending	2.36	1.71	+0.50	0.299
	(1.29)	(0.91)	(1.43)	
Obtaining new and bigger machinery and buildings	1.18	1.64	-0.50	0.177
	(0.41)	(1.01)	(1.01)	
Reducing risk	4.55	n.a.	-	-
	(1.97)			
Increasing supports	5.00	n.a.	-	-
	(1.61)			

Number of cases 11, scale from 1 to 6 (1=not important, 6=very important). N.a. means that the question was not asked in the 1993 survey. Means in 1998 and in 1993 are calculated with all cases. However, the difference between objectives in 1993 and in 1993 is calculated in pairs, thus the distinction between mean in 1998 and mean in 1993 differs from the column ‘difference’. Standard deviation is presented in parenthesis. T-test is used here as a standard measure to compare values. To test the hypothesis that the 1998 and 1993 values have the same mean, the two-tailed test is used to calculate the p-values.

Comparison of changes in objectives for farmers changed production line

Objective	Mean in 1998	Mean in 1993	Diffe-rence	Risk (p)
Increasing farm size	2.81	3.20	-0.81	0.396
	(1.75)	(1.83)	(2.01)	
Ensuring continuity	4.00	4.36	-0.48	0.274
	(1.61)	(1.68)	(1.94)	
Improving quality of life	5.05	4.80	-0.05	0.863
	(0.92)	(1.53)	(1.24)	
Increasing profit	4.38	4.72	-0.33	0.246
	(1.60)	(1.28)	(1.28)	
Improving profit for capital	4.52	4.52	-0.19	0.407
	(1.33)	(1.30)	(1.03)	
Avoiding losses	5.33	5.28	+0.10	0.754
	(0.73)	(1.21)	(1.38)	
Increasing leisure	4.10	4.00	+0.14	0.727
	(1.64)	(1.56)	(1.85)	
Expanding production	3.52	3.32	+0.19	0.713
	(1.99)	(1.91)	(2.34)	
Improving quality of products	4.43	5.16	-1.05	0.014
	(1.66)	(1.14)	(1.77)	
Increasing assets	3.48	3.00	+0.33	0.438
	(1.66)	(1.58)	(1.93)	
Ensuring liquidity	5.48	5.52	-0.05	0.815
	(0.75)	(0.71)	(0.92)	
Taking care of the environment	4.86	5.24	-0.43	0.131
	(1.32)	(0.83)	(1.25)	
Increasing total incomes	4.71	4.08	+0.48	0.153
	(1.19)	(1.55)	(1.47)	
Maintaining low degree of debt to assets	5.05	5.04	+0.05	0.880
	(1.20)	(0.94)	(1.43)	
Increasing household spending	2.19	2.16	0.00	1.00
	(1.25)	(1.11)	(1.32)	
Obtaining new and bigger machinery and buildings	2.10	2.36	-0.38	0.258
	(1.34)	(1.15)	(1.50)	
Reducing risk	4.95	2.81	n.a.	-
	(1.07)	(1.75)		
Increasing supports	4.81	4.00	n.a.	-
	(1.37)	(1.61)		

Number of cases 21, scale from 1 to 6 (1=not important, 6=very important). N.a. means that the question was not asked in the 1993 survey. Means in 1998 and in 1993 are calculated with all cases. However, the difference between objectives in 1993 and in 1993 is calculated in pairs, thus the distinction between mean in 1998 and mean in 1993 differs from the column 'difference'. Standard deviation is presented in parenthesis. T-test is used here as a standard measure to compare values. To test the hypothesis that the 1998 and 1993 values have the same mean, the two-tailed test is used to calculate the p-values.

Comparison of changes in objectives for farmers introduced additional processing for agricultural products

Objective	Mean in 1998	Mean in 1993	Diffe-rence	Risk (p)
Increasing farm size	2.94	4.65	-1.94	0.000
	(1.69)	(1.54)	(1.61)	
Ensuring continuity	3.81	5.29	-1.44	0.022
	(1.97)	(1.31)	(2.25)	
Improving quality of life	5.00	4.77	+0.06	0.901
	(1.27)	(1.48)	(1.98)	
Increasing profit	4.75	4.47	+0.31	0.585
	(1.34)	(1.38)	(2.24)	
Improving profit for capital	5.00	5.06	-0.06	0.906
	(1.46)	(0.97)	(2.08)	
Avoiding losses	5.88	5.82	+0.06	0.669
	(0.34)	(0.53)	(0.57)	
Increasing leisure	4.31	3.53	+0.81	0.109
	(1.14)	(1.51)	(1.91)	
Expanding production	3.44	4.29	-1.06	0.024
	(1.59)	(1.31)	(1.69)	
Improving quality of products	4.81	5.71	-0.88	0.021
	(1.60)	(0.59)	(1.36)	
Increasing assets	3.69	4.12	-0.50	0.281
	(1.58)	(0.99)	(1.79)	
Ensuring liquidity	5.50	5.47	-0.13	0.743
	(1.27)	(0.94)	(1.50)	
Taking care of the environment	5.06	4.82	+0.13	0.684
	(1.29)	(1.33)	(1.20)	
Increasing total incomes	4.63	3.59	+1.00	0.112
	(1.54)	(1.42)	(2.37)	
Maintaining low degree of debt to assets	5.06	5.18	-0.25	0.411
	(1.24)	(0.95)	(1.18)	
Increasing household spending	2.38	2.35	+0.13	0.812
	(1.46)	(1.50)	(2.06)	
Obtaining new and bigger machinery and buildings	2.81	2.59	+0.13	0.783
	(1.68)	(1.23)	(1.78)	
Reducing risk	5.56	n.a.	-	-
	(0.63)			
Increasing supports	4.63	n.a.	-	-
	(1.59)			

Number of cases 16, scale from 1 to 6 (1=not important, 6=very important). N.a. means that the question was not asked in the 1993 survey. Means in 1998 and in 1993 are calculated with all cases. However, the difference between objectives in 1993 and in 1993 is calculated in pairs, thus the distinction between mean in 1998 and mean in 1993 differs from the column 'difference'. Standard deviation is presented in parenthesis. T-test is used here as a standard measure to compare values. To test the hypothesis that the 1998 and 1993 values have the same mean, the two-tailed test is used to calculate the p-values.

Comparison of changes in objectives for farmers increased off-farm incomes

Objective	Mean in 1998	Mean in 1993	Diffe-rence	Risk (p)
Increasing farm size	2.83	3.29	-0.51	0.068
	(1.70)	(1.83)	(1.92)	
Ensuring continuity	3.93	4.52	-0.56	0.026
	(1.79)	(1.64)	(1.73)	
Improving quality of life	4.94	4.64	+0.28	0.193
	(1.25)	(1.42)	(1.50)	
Increasing profit	4.12	4.65	-0.59	0.009
	(1.56)	(1.12)	(1.53)	
Improving profit for capital	4.64	4.48	+0.16	0.495
	(1.30)	(1.38)	(1.66)	
Avoiding losses	5.23	5.35	-0.08	0.717
	(1.30)	(0.95)	(1.55)	
Increasing leisure	4.19	3.73	+0.44	0.109
	(1.67)	(1.52)	(1.91)	
Expanding production	2.75	3.39	-0.65	0.021
	(1.58)	(1.60)	(1.92)	
Improving quality of products	4.19	5.27	-1.04	0.000
	(1.69)	(1.14)	(1.91)	
Increasing assets	3.43	3.75	-0.40	0.129
	(1.60)	(1.55)	(1.83)	
Ensuring liquidity	5.06	5.37	-0.35	0.148
	(1.42)	(1.00)	(1.65)	
Taking care of the environment	4.96	5.00	-0.02	0.924
	(1.14)	(1.16)	(1.48)	
Increasing total incomes	4.57	4.08	+0.44	0.057
	(1.35)	(1.33)	(1.59)	
Maintaining low degree of debt to assets	4.43	5.17	-0.84	0.003
	(1.69)	(1.02)	(1.91)	
Increasing household spending	2.34	2.46	-0.18	0.460
	(1.22)	(1.38)	(1.71)	
Obtaining new and bigger machinery and buildings	2.09	2.02	0.00	1.000
	(1.31)	(1.04)	(1.58)	
Reducing risk	4.68	n.a.		
	(1.30)			
Increasing supports	4.40	n.a.		
	(1.50)			

Number of cases 53, scale from 1 to 6 (1=not important, 6=very important). N.a. means that the question was not asked in the 1993 survey. Means in 1998 and in 1993 are calculated with all cases. However, the difference between objectives in 1993 and in 1993 is calculated in pairs, thus the distinction between mean in 1998 and mean in 1993 differs from the column 'difference'. Standard deviation is presented in parenthesis. T-test is used here as a standard measure to compare values. To test the hypothesis that the 1998 and 1993 values have the same mean, the two-tailed test is used to calculate the p-values.

Appendix 10

Comparison of changes in values in relation to adjustment into the EU.

Comparison of changes in values for maintained farmers

Value	Mean in 1998	Mean in 1993	Diffe-rence	Risk (p)
Lifestyle	5.06	5.16	-0.12	0.172
	(1.03)	(1.05)	(1.12)	
Possibility to gain profit	4.41	4.57	-0.14	0.247
	(1.29)	(1.26)	(1.46)	
Outdoor life	4.65	4.69	-0.05	0.632
	(1.30)	(1.18)	(1.35)	
Independence of work	5.20	5.44	-0.27	0.005
	(1.05)	(0.85)	(1.17)	
Respect received from the work	4.23	4.09	+0.12	0.365
	(1.43)	(1.46)	(1.69)	
Entrepreneurship	4.69	4.89	-0.20	0.059
	(1.08)	(1.12)	(1.27)	
Possibility to develop oneself	4.52	4.66	-0.09	0.091
	(1.06)	(1.25)	(1.42)	
Belonging to farm community	4.08	3.89	+0.27	0.051
	(1.40)	(1.37)	(1.68)	
Environmentally friendly production	4.59	4.22	+0.42	0.000
	(1.16)	(1.35)	(1.36)	
Assurance of job	4.90	4.86	+0.09	0.398
	(1.14)	(1.32)	(1.33)	
Challenge in work	4.73	4.69	+0.07	0.550
	(1.04)	(1.21)	(1.35)	
Continuing family farm	4.52	4.81	-0.24	0.042
	(1.45)	(1.27)	(1.46)	
Possibility to express oneself	4.74	4.81	-0.11	0.275
	(1.07)	(1.15)	(1.18)	
Possibility to expand production	3.41	3.97	-0.65	0.000
	(1.50)	(1.39)	(1.69)	
Possibility to receive reasonable incomes	4.99	4.79	+0.20	0.072
	(1.08)	(1.20)	(1.38)	
Possibility to do work you like	5.09	5.13	-0.06	0.472
	(0.96)	(0.95)	(1.01)	
Versatility of work	5.08	5.21	-0.08	0.375
	(1.01)	(0.94)	(1.09)	

Number of cases 172, scale from 1 to 6 (1=not important, 6=very important). Means in 1998 and in 1993 are calculated with all cases. However, the difference between values in 1993 and in 1993 is calculated in pairs, thus the distinction between mean in 1998 and mean in 1993 differs from the column 'difference'. Standard deviation is presented in parenthesis. T-test is used here as a standard measure to compare values. To test the hypothesis that the 1998 and 1993 values have the same mean, the two-tailed test is used to calculate the p-values.

Comparison of changes in values for expanded farmers

Value	Mean in 1998	Mean in 1993	Diffe-rence	Risk (p)
Lifestyle	4.66	4.97	-0.35	0.053
	(1.25)	(1.30)	(1.64)	
Possibility to gain profit	4.50	4.28	+0.23	0.132
	(1.31)	(1.49)	(1.42)	
Outdoor life	4.11	4.52	-0.44	0.010
	(1.35)	(1.35)	(1.55)	
Independence of work	5.26	5.45	-0.20	0.144
	(0.96)	(0.91)	(1.24)	
Respect received from the work	4.35	4.04	+0.31	0.056
	(1.44)	(1.57)	(1.50)	
Entrepreneurship	4.86	5.14	-0.36	0.014
	(1.09)	(1.18)	(1.33)	
Possibility to develop oneself	4.71	5.02	-0.32	0.009
	(0.99)	(1.09)	(1.12)	
Belonging to farm community	3.88	3.95	-0.13	0.502
	(1.30)	(1.50)	(1.75)	
Environmentally friendly production	4.56	4.48	+0.08	0.619
	(1.16)	(1.28)	(1.51)	
Assurance of job	4.92	5.12	-0.17	0.248
	(1.24)	(1.17)	(1.38)	
Challenge in work	5.00	5.18	-0.21	0.140
	(1.06)	(1.09)	(1.30)	
Continuing family farm	4.54	5.00	-0.54	0.000
	(1.59)	(1.27)	(1.33)	
Possibility to express oneself	4.78	5.02	-0.37	0.012
	(1.08)	(1.11)	(1.33)	
Possibility to expand production	4.34	4.43	-0.12	0.483
	(1.24)	(1.29)	(1.52)	
Possibility to receive reasonable incomes	5.14	4.88	+0.25	0.074
	(0.97)	(1.51)	(1.31)	
Possibility to do work you like	5.07	5.21	-0.16	0.211
	(1.11)	(1.15)	(1.19)	
Versatility of work	5.27	5.38	-0.18	0.066
	(0.86)	(0.87)	(0.92)	

Number of cases 94, scale from 1 to 6 (1=not important, 6=very important). Means in 1998 and in 1993 are calculated with all cases. However, the difference between values in 1993 and in 1993 is calculated in pairs, thus the distinction between mean in 1998 and mean in 1993 differs from the column ‘difference’. Standard deviation is presented in parenthesis. T-test is used here as a standard measure to compare values. To test the hypothesis that the 1998 and 1993 values have the same mean, the two-tailed test is used to calculate the p-values.

Comparison of changes in values for reduced farmers

Value	Mean in 1998	Mean in 1993	Diffe-rence	Risk (p)
Lifestyle	5.46	5.39	-0.18	0.553
	(1.96)	(1.33)	(0.98)	
Possibility to gain profit	4.09	5.39	-1.18	0.134
	(2.12)	(1.04)	(2.40)	
Outdoor life	4.27	5.15	-0.82	0.192
	(1.90)	(0.99)	(1.94)	
Independence of work	4.64	5.77	-1.09	0.104
	(1.96)	(0.60)	82.02)	
Respect received from the work	3.46	4.33	-1.00	0.322
	(1.86)	(1.78)	(3.02)	
Entrepreneurship	4.27	5.00	-0.55	0.500
	(1.68)	(1.35)	(2.58)	
Possibility to develop oneself	3.46	5.00	-1.46	0.124
	(1.92)	(1.68)	(2.88)	
Belonging to farm community	3.36	3.92	-0.46	0.588
	(1.91)	(1.85)	(2.70)	
Environmentally friendly production	4.27	4.15	0.00	1.000
	(1.70)	(1.57)	(1.18)	
Assurance of job	4.64	5.08	-0.55	0.480
	(1.96)	(1.44)	(2.46)	
Challenge in work	3.80	5.15	-1.10	0.330
	(2.10)	(1.68)	(3.38)	
Continuing family farm	4.64	4.69	0.00	1.000
	(1.63)	(1.44)	(2.37)	
Possibility to express oneself	4.00	5.23	-1.09	0.198
	(1.79)	(1.48)	(2.63)	
Possibility to expand production	2.46	3.23	-0.64	0.426
	(1.57)	(1.74)	(2.54)	
Possibility to receive reasonable incomes	5.09	5.39	-0.64	0.172
	(1.45)	(0.96)	(1.43)	
Possibility to do work you like	5.18	5.00	+0.09	0.839
	(1.17)	(1.35)	(1.45)	
Versatility of work	4.64	5.54	-0.91	0.127
	(1.63)	(0.66)	(1.81)	

Number of cases 11, scale from 1 to 6 (1=not important, 6=very important). Means in 1998 and in 1993 are calculated with all cases. However, the difference between values in 1993 and in 1993 is calculated in pairs, thus the distinction between mean in 1998 and mean in 1993 differs from the column ‘difference’. Standard deviation is presented in parenthesis. T-test is used here as a standard measure to compare values. To test the hypothesis that the 1998 and 1993 values have the same mean, the two-tailed test is used to calculate the p-values.

Comparison of changes in values for farmers changed production line

Value	Mean in 1998	Mean in 1993	Diffe-rence	Risk (p)
Lifestyle	4.62	4.79	-0.15	0.732
	(1.69)	(1.38)	(1.93)	
Possibility to gain profit	4.62	4.17	+0.50	0.234
	(1.24)	(1.63)	(1.82)	
Outdoor life	4.57	4.58	+0.10	0.766
	(0.98)	(1.32)	(1.48)	
Independence of work	5.24	5.38	-0.30	0.186
	(0.77)	(1.06)	(0.98)	
Respect received from the work	4.48	3.42	+0.70	0.090
	(1.25)	(1.74)	(1.75)	
Entrepreneurship	5.05	5.04	0.00	1.000
	(1.12)	(0.91)	(1.34)	
Possibility to develop oneself	4.57	4.33	+0.05	0.893
	(1.17)	(1.49)	(1.64)	
Belonging to farm community	3.95	3.92	-0.20	0.569
	(1.53)	(1.86)	(1.54)	
Environmentally friendly production	4.71	4.50	+0.05	0.867
	(1.15)	(1.35)	(1.32)	
Assurance of job	4.38	4.50	-0.20	0.585
	(1.40)	(1.35)	(1.61)	
Challenge in work	4.71	5.00	-0.40	0.176
	(1.27)	(0.98)	(1.27)	
Continuing family farm	4.71	4.38	-0.05	0.883
	(1.49)	(1.53)	(1.50)	
Possibility to express oneself	4.81	4.46	0.00	1.000
	(0.98)	(1.38)	(1.30)	
Possibility to expand production	3.95	3.50	+0.20	0.624
	(1.69)	(1.75)	(1.80)	
Possibility to receive reasonable incomes	4.62	4.46	0.00	1.000
	(1.16)	(1.38)	(1.38)	
Possibility to do work you like	5.05	4.92	-0.30	0.316
	(0.87)	(1.53)	(1.30)	
Versatility of work	5.24	5.08	-0.10	0.649
	(0.77)	(1.02)	(0.97)	

Number of cases 21, scale from 1 to 6 (1=not important, 6=very important). Means in 1998 and in 1993 are calculated with all cases. However, the difference between values in 1993 and in 1993 is calculated in pairs, thus the distinction between mean in 1998 and mean in 1993 differs from the column ‘difference’. Standard deviation is presented in parenthesis. T-test is used here as a standard measure to compare values. To test the hypothesis that the 1998 and 1993 values have the same mean, the two-tailed test is used to calculate the p-values.

Comparison of changes in values for farmers introduced additional processing for agricultural products

Value	Mean in 1998	Mean in 1993	Diffe-rence	Risk (p)
Lifestyle	4.67	4.69	+0.14	0.775
	(1.84)	(1.25)	(1.83)	
Possibility to gain profit	4.47	4.56	-0.07	0.861
	(1.36)	(1.26)	(1.49)	
Outdoor life	4.60	4.06	+0.14	0.770
	(1.30)	(1.61)	(1.79)	
Independence of work	5.27	5.19	+0.21	0.596
	(1.03)	(1.38)	(1.48)	
Respect received from the work	4.33	4.06	+0.29	0.598
	(1.59)	(1.65)	(1.98)	
Entrepreneurship	5.33	4.94	+0.43	0.254
	(1.29)	(0.85)	(1.34)	
Possibility to develop oneself	4.67	4.88	-0.07	0.818
	(1.18)	(0.96)	(1.14)	
Belonging to farm community	3.53	3.81	-0.36	0.444
	(1.46)	(1.64)	(1.69)	
Environmentally friendly production	4.80	4.19	+0.71	0.086
	(1.15)	(1.38)	(1.44)	
Assurance of job	4.40	4.63	-0.14	0.770
	(1.68)	(1.41)	(1.79)	
Challenge in work	4.73	4.50	+0.29	0.414
	(1.71)	(1.67)	(1.27)	
Continuing family farm	4.13	4.44	-0.29	0.336
	(2.00)	(1.75)	(1.07)	
Possibility to express oneself	4.87	4.75	+0.07	0.856
	(1.41)	(1.44)	(1.44)	
Possibility to expand production	3.47	4.38	-0.86	0.047
	(1.36)	(1.41)	(1.46)	
Possibility to receive reasonable incomes	4.53	4.63	0.00	1.000
	(1.60)	(1.09)	(1.75)	
Possibility to do work you like	5.20	5.25	0.00	1.000
	(1.01)	(1.24)	(1.18)	
Versatility of work	5.07	4.81	+0.29	0.263
	(0.96)	(1.17)	(0.91)	

Number of cases 15, scale from 1 to 6 (1=not important, 6=very important). Means in 1998 and in 1993 are calculated with all cases. However, the difference between values in 1993 and in 1993 is calculated in pairs, thus the distinction between mean in 1998 and mean in 1993 differs from the column 'difference'. Standard deviation is presented in parenthesis. T-test is used here as a standard measure to compare values. To test the hypothesis that the 1998 and 1993 values have the same mean, the two-tailed test is used to calculate the p-values.

Comparison of changes in values for farmers increased off-farm incomes

Value	Mean in 1998	Mean in 1993	Diffe-rence	Risk (p)
Lifestyle	4.89	4.96	-0.11	0.589
	(1.44)	(0.96)	(1.52)	
Possibility to gain profit	4.02	4.17	-0.15	0.478
	(1.43)	(1.44)	(1.55)	
Outdoor life	4.55	4.51	+0.02	0.914
	(1.34)	(1.22)	(1.26)	
Independence of work	5.04	5.26	-0.25	0.150
	(1.06)	(1.06)	(1.22)	
Respect received from the work	3.72	3.40	+0.26	0.247
	(1.65)	(1.50)	(1.64)	
Entrepreneurship	4.11	4.55	-0.47	0.060
	(1,66)	(1.30)	(1.78)	
Possibility to develop oneself	3.89	4.07	-0.25	0.298
	(1.49)	(1.44)	(1.70)	
Belonging to farm community	3.57	3.47	+0.08	0.723
	(1.51)	(1.45)	(1.54)	
Environmentally friendly production	4.25	3.86	+0.43	0.043
	(1.25)	(1.39)	(1.53)	
Assurance of job	3.91	3.89	-0.02	0.941
	(1.71)	(1.70)	(1.85)	
Challenge in work	4.02	4.16	-0.21	0.318
	(1.56)	(1.30)	(1.50)	
Continuing family farm	4.34	4.47	-0.17	0.475
	(1.65)	(1.53)	(1.72)	
Possibility to express oneself	4.26	4.24	-0.04	0.852
	(1.44)	(1.40)	(1.47)	
Possibility to expand production	2.94	3.35	-0.42	0.064
	(1.47)	(1.49)	(1.60)	
Possibility to receive reasonable incomes	4.19	3.82	-0.32	0.123
	(1.51)	(1.55)	(1.49)	
Possibility to do work you like	4.57	4.76	-0.23	0.325
	(1.54)	(1.36)	(1.66)	
Versatility of work	4.59	4.84	-0.28	0.216
	(1.39)	(1.51)	(1.65)	

Number of cases 53, scale from 1 to 6 (1=not important, 6=very important). Means in 1998 and in 1993 are calculated with all cases. However, the difference between values in 1993 and in 1993 is calculated in pairs, thus the distinction between mean in 1998 and mean in 1993 differs from the column ‘difference’. Standard deviation is presented in parenthesis. T-test is used here as a standard measure to compare values. To test the hypothesis that the 1998 and 1993 values have the same mean, the two-tailed test is used to calculate the p-values.